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THE A_1–A_2–B–O, M–N AND Rh BLOOD GROUPS IN SOUTHERN CHINESE: HAK-KAS, CANTONESE AND HOKKIENS.

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DURING an earlier period of intense blood grouping activity many surveys on the A B O blood groups in Chinese were carried out. The results of these surveys have been tabulated by Boyd (1939). The outstanding feature was the high frequency of group B expressed as q the gene for this blood group. The highest values for q in this race appeared in the northern Chinese with lower values in the southern Chinese. Evidence was thus seen of a north-south gradient for values of q to which Bernstein (1932) had drawn attention.

The accumulated data to 1939 on the world distribution of p the gene for group A, and on q the gene for group B, were conveniently presented by Boyd geographically. By means of this method it was possible to see at a glance, from hypothetical lines connecting points of supposed equal gene frequencies in different countries, that the highest values for q in the world were in Central Asia. Although the data on which Boyd's maps were based were incomplete and the "contour" lines ("isogenes") passed through areas of unknown frequencies, the general picture has proved both useful and reasonably accurate. From the isogenes it can be seen that, for example, India, Afghanistan, Persia, Turkestan, China, Mongolia and Manchuria all have very high values for q, and that there was only slight falling away in values in parts of China, Japan, Korea and Siam and in areas southwards to Java and Borneo. Recent figures show that Siam should also be included with those areas showing the highest values for q (Phansomboon, Ikin and Mourant, 1949).

It appears that prior to 1939 no investigations had been carried out on the A_1–A_2 subgroups of group A in the Chinese people, and that only one investigation on the M–N types (Ride, 1935) had been made on Chinese residents of Hong Kong.

After the discovery of the Rh factor, two investigations on this blood group were reported on presumably pure-blooded Chinese resident in America (Levine and Wong, 1943; Wiener, Sonn and Yi, 1944). In each survey tests were also made for the blood groups, A_1–A_2 subgroups and M–N types.

The origin of the Chinese people is not known, but historical records date back to about 2000 B.C. Although the data presented here relate to the blood group genetics of the Chinese, and none of the authors are anthropologists, we think it worth while to present from relevant literature a brief historical background of the people concerned in this investigation.

Historical Background.

Racially the Chinese tend to be a somewhat mixed people, having been invaded by non-Chinese stocks from the less favoured regions of the north, north-east and west. In addition, the Chinese themselves have invaded other territories and have partly absorbed the aboriginal inhabitants. It is believed that the sharp divisions between commoners and aristocrats in ancient times represented also a racial difference. On the other hand, skeletal remains from ancient chalcolithic[1] cultures indicate a continuity that is almost an identity between the peoples of the more remote civilization and the inhabitants of the same region today. If that should prove to be true, later infiltrations of other

[1] On the border line between the stone age and the bronze age.

stocks have wrought no very profound degree of modification.

The political unity of China during a large part of its history, and consequent absence of internal political barriers to migration within the Empire, also made for uniformity —in contrast, for example, with Europe. As a result, no other group of mankind which is similar to the Chinese today in numerical strength approximates to it in homogeneity (Latourette, 1947).

The Hak-kas.

Among peoples obviously Chinese, however, some marked groupings do occur which verge on the racial and seem to provide evidence of imperfect amalgamation. One of the most notable examples is the Hak-kas. The word itself means "guest people" or "stranger people". They are a group which have attracted the attention of investigators, but have not been investigated as they are worthy to be (Shirokogoroff, 1925). The Hak-kas dwell mostly in the hilly regions of Kiang-si, Fukien, Kwangtung and Kwangsi, speak a distinctive dialect which is close to Mandarin and possess some customs which set them apart from their neighbours—as for example, their refusal to bind the feet of their women and their distinctive forms of dress and ornamentation.

The Hak-kas are believed to have originated in the north of China somewhere in the Shantung and Shan-si provinces near the Huang Ho (Yellow River) and to have migrated southwards and eastwards in three main waves during periods of political stress, persecution or famine.

They were subjected to a bloody persecution in the time of the T'sin dynasty (B.C. 249 to 209), and this started them off on their travels southwards. Further persecution in A.D. 419 finally scattered them entirely from the north of China, and a general stampede carried some of them into the mountainous regions in the south-east of Kiang-si and to the borders of the Fukien province. At the beginning of the T'ang dynasty (A.D. 618) they were compelled to move again. The majority took refuge in the mountains of Fukien, while a few hovered on the high mountain chains which separate the Kiang-si and Kwangtung (Canton) provinces. Under the Sung dynasties (A.D. 960 to 1280) many of the Hak-kas became soldiers, and thousands of them perished with the last Chinese prince of the Southern Sung dynasty in A.D. 1280, west of Macao, when the Mongols under Kublai Khan were coming into power in southern China.

Under the Mongols, the Hak-kas made their first appearance within the borders of the Kwangtung province, but did not settle there permanently until the beginning of the Ming dynasty (A.D. 1368), when the Fukien Hak-kas, after centuries of residence there, were compelled by disturbances to seek a new home. They came in such overwhelming numbers that they drove everything before them in the Ka-yin-chu prefecture of Kwangtung province, which has remained their headquarters ever since (Dyer Ball, 1926). But even there the wandering Hak-kas were not to find their haven of rest, and as recently as 1864 a dreadful internecine warfare started with the Cantonese, whose province they had adopted as their home, and more than 150,000 Hak-kas perished. Once more some of the Hak-kas, under compulsion of the Chinese Government, started on their travels, and these particular displaced groups ended finally as scattered remnants in the province of Kwangsi, with a few on the island of Hainan.

They are said to differ physically from the groups among which they live, but are closest to the population of Kwangtung. Owing to their custom of marrying local women and their characteristic traits they have left evidence of their presence wherever they settled.

In Malaya there are over 400,000 Hak-kas who are probably the most rurally inclined of all the Chinese groups there, and they, together with the Cantonese, provide the bulk of the Malayan tin-mining population. They are also widely engaged in agricultural pursuits (Del Tufo, 1949).

The Cantonese and the Hokkiens.

South China was probably once peopled, in part, by Negritos of types similar to those still found in south-east Asia. The Thai, now strong in the extreme south and south-west, and represented by the modern Siamese, very likely once reached much farther northwards than at present. Possibly, too, there were other racial strains (Dyer Ball, 1926).

The Cantonese dialect is the oldest of the languages spoken, and is more akin to the ancient language of China spoken 3000 years ago. (The Hak-ka language also contains traces of high antiquity.) Next in age come the Amoy and Swatow dialects, which are spoken by the people of the Fukien province—that is, the Hokkiens.

Information on the origins of the Cantonese[1] and the Hokkiens is difficult to obtain; but they are believed to have originated, like the Hak-kas, in northern China, and to have migrated in various waves to their present south-eastern provinces of Kwangtung and Fukien respectively. These provinces are mostly isolated from the rest of China by formidable mountain ranges, which, once penetrated, would tend to prevent further communication. Both provinces have an extensive seaboard, and Fukien is served by the ports of Foochow, Amoy and Swatow, while the main waterways of Kwangtung converge on Canton,[2] which is situated near a triple riverine delta.

Chinese history records many severe famines and floods, which the provinces of Kwangtung and Fukien have largely escaped (Purcell, 1948). Their comparative isolation by mountain ranges seems to have made for relatively settled conditions, also for the development in isolation of certain group characteristics.

The Hokkiens are of an urban habit and have a genius for trade and shopkeeping, while the Cantonese are rather more versatile. Although strongly represented in Malaya as regards agricultural pursuits, the Cantonese take equally well to urban life when circumstances are favourable; but their predilection is for mining in which large numbers are employed. The 1947 Malayan census report gives the following figures: Hokkiens 827,411, Cantonese 641,925 (Del Tufo, 1949).

The Hainanese.

The Chinese are said to have come to the island of Hainan in 111 B.C. during the early Han dynasty ("Encyclopædia Britannica", 1929), and for centuries the island was a kind of semi-tropical Siberia where imperial dynasts dumped political foes, most famous of whom was the poet Su Tung-po (A.D. 1036 to 1101). The stream of political and other deportees was maintained for some centuries. Migration occurred from Kwangtung to the north of the Hainan island during the Mongol onslaught in the Southern Sung dynasty (A.D. 1127 to 1279) and during the Ming dynasty (A.D. 1368 to 1644), while other migrations from Fukien province to Hainan occurred from 1644 onwards. The main points of departure from Fukien were from Swatow and Amoy; and near the latter port is Chang Chow, the dialect of which is readily understood by Hainanese and has been largely incorporated into the Hainanese language. This latter is the *lingua franca* of the various dialects spoken on Hainan island, but the language itself is also spoken on the adjacent Lui-chow peninsula of Kwangsi province. On the island of Hainan there are also a number of aboriginal tribes, some inhabiting the "Five-finger" mountains. One group known as the Sheng-li (barbarians) seems to be closely related to the Laos of Siam and Indo-China. A second group, the Shu-li (civilized savages), are of mixed descent, but are largely descendants of refugees from the mainland, especially Hak-ka and Miaotze peoples.

In Malaya the Hainanese[3] in the towns and villages for which they show a preference are chiefly employed in shopkeeping and domestic service, but they are also widely distributed in the rural and particularly the rubber-growing

[1] There is a record of an engagement between the Chinese and the Kwangtung aborigines which took place in B.C. 220 close to the present city of Canton, after which the territories of Kwangtung, Kwansi and Annam were incorporated into the dominion of Emperor Chin Shih, the builder of the Great Wall (Cressy, 1944).

[2] The city of Canton was founded in A.D. 1053 ("Encyclopædia Britannica", 1929).

[3] The usual term for a Hainanese in Malaya is "Hylam".

TABLE I.

Blood Groups and M-N Types in Southern Chinese.

Chinese Population.	Where Collected and Province of Origin.	Number of Blood Samples Tested.	Blood Groups.				Gene Frequencies.			M-N Types.			Gene Frequencies.	
			O	A_1	B	A_1B	*p*	*q*	*r*	M	MN	N	*m*	*n*
Hak-kas.	Malaya (Several).[1]	100	48 (48%)	25 (25%)	20 (20%)	7 (7%)	0·162	0·132	0·693	37 (37%)	54 (54%)	9 (9%)	0·640	0·360
Cantonese.	Malaya (Kwangtung).	97	45 (46·4%)	22 (22·7%)	21 (21·6%)	9 (9·3%)	0·150	0·144	0·681	45 (46·4%)	40 (41·2%)	12 (12·4%)	0·670	0·330
Hokkiens.	Malaya (Fukien).	44	19 (43·2%)	14 (31·8%)	8 (18·2%)	3 (6·8%)	0·209	0·126	0·657	11 (25·0%)	21 (47·7%)	12 (27·3%)	0·489	0·511
Hainanese.	Malaya (Hainan Island)	9	4	2	3	0				5	4	0		
Total ..	.. ..	250	116 (46·4%)	63 (25·2%)	52 (20·8%)	19 (7·6%)	0·165	0·139	0·681	98 (39·2%)	119 (47·6%)	33 (13·2%)	0·630	0·370

[1] Several provinces including Kwangtung and Fukien.

districts. Their numbers in Malaya are given in the 1947 census as 157,649.

Materials and Methods.

It was considered that further investigations on the various blood groups of selected Chinese, whose province of origin was known, might add new blood genetic data to those already published. With this in view, blood samples were collected from 250 Chinese individuals into glucose-citrate blood-preserving fluid (Simmons and Graydon, 1945). The samples were taken during 1949 in Malaya by one of us (R.G.), and were despatched by air freight to Melbourne packed in iced "Thermos" flasks, according to the technique described in earlier papers. Most of the blood group determinations were made with the same testing reagents as were used by Simmons, Graydon and Avias (1949). The methods used for these slide tests, and the sterile techniques for handling antiserum and red cells, have been previously described (Simmons, 1949; Simmons and Graydon, 1950).

Results and Discussion.

In this survey a total of 250 Chinese consisting of Hak-kas, Cantonese, Hokkiens and Hainanese who originated mainly in the provinces of Kwangtung and Fukien and on Hainan island, have been tested for their A B O blood groups, subgroups, and M–N and Rh types. Some tests with anti-Lewis serum have also been carried out.

The results of the A B O and M–N tests are shown in Table I.

The values obtained for *p* the gene for group A, *q* the gene for group B, and *r* the gene for group O are of the same order as those obtained in earlier surveys on southern Chinese (Boyd, 1939).

Wiener, Sonn and Yi (1944) tested 138 southern Chinese resident in New York for blood groups, subgroups and M–N and Rh types, and their findings and ours are similar. In their discussion on group B in Chinese they mention that the first observations on the distribution of *q* in various races were made by Hirschfeld and Hirschfeld (1919), who pointed out that there was a progressive increase in the frequency of *q* from west to east in Eurasia. Bernstein (1932) pointed out that the highest values for *q* occurred in Central Asia, particularly in the vicinity of the Indus and Ganges rivers, and that to the north, south, east or west there was a progressive decrease in values for *q* with few exceptions, and that these occurred in nomads and some island races, among whom intermarriage or isolation had appreciably altered the blood group distributions. Candela (1942) suggested that group B arose by mutation in Central Asia, from whence it spread throughout the world in all directions. Investigations have shown that in the so-called marginal peoples of the world, such as the Australian aborigines, Maoris, Polynesians, Eskimos and American Indians, group B is absent or rare. In the case of the Australian aborigines a small number of persons in the far north possess group B, but this is largely due to the known interchange of visits between the aborigines and the Melanesian peoples of New Guinea.

In relation to China, Bernstein pointed out that a fall in the frequency of *q* was noticed from north to south and that the values for *q* in the north are significantly higher than in southern China, the dividing line being the Yangtze river. In a series of 5435 persons the following frequencies were quoted:

North China: $p = 20{\cdot}6$, $q = 19{\cdot}5$, $r = 59{\cdot}4$
South China: $p = 21{\cdot}3$, $q = 15{\cdot}0$, $r = 65{\cdot}2$

The value obtained for *q*, 0·139 (or 13·9) in the present survey, adds further support to the earlier observations

TABLE II.

The M-N Types in Chinese.

Population.	Authors.	Number of Blood Samples Tested.	M-N Types.			Gene Frequencies.	
			M	MN	N	*m*	*n*
Chinese (Hong Kong) ..	Ride (1935)	1029	33·2%	48·6%	18·2%	0·575	0·425
Chinese (Cantonese), Boston, U.S.A.	Alley and Boyd (1943) ..	101	38·6%	45·5%	15·8%	0·614	0·386
Chinese (Southern China), New York, U.S.A.	Wiener, Sonn and Yi (1944)	138	31·9%	46·4%	21·7%	0·551	0·449
Chinese (Hak-kas, Cantonese, Hokkiens), Malaya.	Present Survey[1]	250	39·2%	47·6%	13·2%	0·630	0·370
Chinese (Unspecified), New York, U.S.A.	Levine and Wong (1943)	150	23·3%	54·7%	22·0%	0·506[(1)]	0·493[(1)]

[1] M-N results for individual Chinese groups are shown in Table I.

TABLE III.
The RH Types in Southern Chinese.

Chinese Population.	Number of Blood Samples Tested.	Anti-Rh_0 (Anti-D) Positive.	Percentage.	Rh_1Rh_1	Rh_1Rh_0	Rh_2Rh_2	Rh_2Rh_0	Rh_1Rh_2	Rh_1Rh_Z	Rh_0
Hak-kas ..	100	100	100	54 (54%)	2 (2%)	6 (6%)	0 (0)	36 (36%)	1 (1%)	1 (1%)
Cantonese ..	97	97	100	59 (60·8%)	9 (9·3%)	3 (3·1%)	0 (0)	25 (25·8%)	0	1 (1%)
Hokkiens ..	44	44	100	27 (61·4%)	2 (4·5%)	2 (4·5%)	2 (4·5%)	11 (25·0%)	0	0
Hainanese ..	9	9	100	5	1	0	0	2	1	0
Total ..	250	250	100	145 (58·0%)	14 (5·6%)	11 (4·4%)	2 (0·8%)	74 (29·6%)	2 (0·8%)	2 (0·8%)

Estimated gene frequencies: $R^1 = 0·760$, $R^2 = 0·195$, $R^0 = 0·040$, $R^Z = 0·005$.

that southern Chinese have a lower value for *q* than northern Chinese.

It has been suggested that the Chinese originated in the Tigris-Euphrates valley, or that the Chinese as well as the earliest civilized inhabitants of Mesopotamia came from Central Asia. It is not known, however, how or when group B was introduced into China; but the frequency of *q* is high as it is also in the present-day inhabitants of Iraq.

The Subgroups of Group A.

In all the coloured Pacific races so far tested by two of the present authors, the absence of subgroup A_2 has been clearly demonstrated. These races include the Australian aborigines, Maoris, New Caledonians, Fijians, natives of New Guinea and Papua, Admiralty Islanders, Indonesians, Filipinos, Japanese and other groups whose findings are as yet unpublished. In the present survey 63 persons of group A and 19 of group AB were all of subgroup A_1 and A_1B. Levine and Wong (1943) stated that they tested 58 Chinese of group A and group AB, and only two, both in group AB, belonged to group A_2B. Wiener *et alii* (1944) tested 57 of groups A and AB, and all reacted with anti-A_1 serum. Thus it can be stated that in pure Chinese as in other coloured peoples in the Pacific subgroup A_2 is absent or extremely rare.

The M–N Types.

The *m* and *n* frequencies for the individual groups in this survey are shown in Table I. Similar results were obtained for the Hak-kas and Cantonese, but the frequencies obtained for the Hokkiens were appreciably different. In this group, however, the number tested was only 44. The results of all the published data seen by us for the Chinese are given in Table II. The frequencies generally are similar to those of most of the world's races with the exception of the marginal peoples.

The figures for Chinese from Hong Kong (Ride, 1935), for Cantonese (Alley and Boyd, 1943), for unspecified southern Chinese (Wiener *et alii*, 1944), and for southern Chinese mainly from the provinces of Kwangtung and Fukien (present survey), are very similar. The results of the survey by Levine and Wong (1943) on 150 unspecified Chinese in New York show a distinctly lower frequency of *m* and a correspondingly higher frequency of *n*.

If the Chinese inhabitants of New York on whom Levine and Wong's survey was made were drawn from many parts of China and included appreciable representation of the northern Chinese, one would expect their sampling to show frequencies intermediate between those of southern and northern groups. If that assumption is correct and the observed frequencies reflect truly the underlying genetic composition, the northern Chinese on whom no M–N determinations have been made should have a lower *m* frequency than any of those shown in Table II. This would not be in agreement with Boyd's theory of the north-south gradient of *m*. There is obvious need for further M–N investigations on larger samplings of Chinese groups inhabiting specific localities of these vast east-Asian territories.

The Rh Types.

The Rh findings for the present survey, given in Table III, reveal a similarity of results for the individual groups.

The first Rh tests on 150 Chinese were reported by Levine and Wong (1943), and from their results it can be seen (by the use of recent nomenclature) that 99·3% gave positive findings with anti-Rh_0 (anti-D) serum and 93% gave positive findings with anti-rh' (anti-C) serum. These authors found one Chinese who was regarded as Rh-negative. Wiener *et alii* (1944) used anti-Rh_0 and anti-rh' followed by anti-rh'' (anti-E) serum for testing those cells found not to react with anti-rh' serum. They Rh typed 138[1] Chinese as far as was then possible. No anti-hr' (anti-c) tests on Rh_1 cells could be made at that time. In this series, which also was composed of Chinese living in New York, 1·5% were regarded as Rh-negative.

[1] In a subsequent paper (Wiener, Zepeda, Sonn and Polivka, 1945), which gives the Rh type percentages and the gene frequencies, the number of Chinese tested was given as 132. No explanation has been seen for the discrepancy in the numbers quoted.

TABLE IV.
The RH Types in Chinese.

Population.	Authors.	Number of Blood Samples Tested.	Rh Types.								Gene Frequencies.				
			rh	Rh_1Rh_1	Rh_1Rh_0	Rh_2Rh_2	Rh_2Rh_0	Rh_1Rh_2	Rh_1Rh_Z	Rh_0	R^1	R^2	R^0	R^Z	r
Chinese (Southern China).	Wiener, Sonn and Yi (1944).	132[1]	1·5%	60·6%		3·0%		34·1%		0·8%	0·770	0·207	0·004	0	0·019
Chinese (Southern China).	Present survey ..	250	0	58·0%	5·6%	4·4%	0·8%	29·6%	0·8%	0·8%	0·760	0·195	0·040	0·005	0

[1] The Rh types and gene frequencies quoted were given by Wiener, Zepeda, Sonn and Polivka (1945).

TABLE V.

The A B O Blood Groups in the Sakai of Malaya.

Population.	Where Collected.	Number of Blood Samples Tested.	Blood Groups.				Gene Frequencies.		
			O	A	B	AB	*p*	*q*	*r*
Sakai	Malaya	165	89 (54%)	17 (10%)	51 (31%)	8 (5%)	0·067	0·187	0·734

The Rh types of Chinese in the present series were determined by the use of anti-Rh_0 (anti-D), anti-rh′ (anti-C), anti-rh″ (anti-E), anti-hr′ (anti-c) and anti-hr″ (anti-e) sera.

The sample of anti-e serum used was kindly made available to us by Dr. A. E. Mourant and the anti-hr′ (anti-c) serum by Dr. J. M. Hill. We record our gratitude for these gifts.

The Rh types and gene frequencies found by Wiener and his associates and those found in the present survey are generally similar, but there are two important differences. In the present, and somewhat larger survey, the presence of the R^z (or R^y) gene has been demonstrated, but the gene *r* (Rh-negative) was not detected.

The respective Rh types and gene frequencies are shown in Table III.

The Rh genes R^1, R^2, R^o and R^z appear to be common to most of the Pacific races already tested.

The Lewis Blood Group in Chinese.

Seventy-one Chinese blood samples of group O were tested with anti-Le^a serum and 11 (15·5%) of these gave positive reactions. The series was only a small one, and the findings presented are subject to confirmation when further blood samples and also saliva samples can be obtained. If the Lewis results give good correlation with the presence or absence of A B O group-specific substances in saliva, this will serve to check the accuracy of the Lewis test results.

Agglutinogen P Tests in Hak-kas.

Thirty-three blood samples from Hak-kas were tested with an anti-P serum at room temperature. (We now perform these tests at 5° C. as a routine.) Twenty-two, or 66%, were classed as giving positive results and 11 as giving negative results. While it is our wish that these results be treated with reserve subject to confirmation, yet they do indicate that agglutinogen P is present in Chinese, and its frequency is probably of the same order as that found in other races tested to date for this factor.

R^z or R^y in Filipinos.

Simmons and Graydon (1945 and 1947) presented the Rh types and possible Rh gene frequencies in 100 Filipinos; but in this sample R^z was not found. It was therefore with much interest that, during a recent demonstration of Rh tests to a visiting Filipino scientist, it was shown that his blood agglutinated with anti-Rh_0 (anti-D), anti-rh′ (anti-C), anti-rh″ (anti-E) and anti-hr″ (anti-e) serum, but failed to agglutinate with several potent examples of anti-hr′ (anti-c) serum. His blood would therefore be classed as $Rh_1\,Rh_z$ or $Rh_1\,Rh_y$. At present, as no means are available to us for separating Rh_z or Rh_y, it is proposed to conform to our usual practice and refer to the gene as R^z. The gene R^z has therefore been demonstrated in the Filipino people, and in this respect they resemble other Pacific races in possessing the four Rh genes enumerated above.

The A B O Blood Groups in the Sakai of Malaya.

The Sakai, Semang, Jakun and Temiars are somewhat mixed aboriginal groups now living in the remote hills of Malaya. They are seldom seen, and today contact with them through jungle routes is impossible owing to unsettled local conditions.

Some years ago one of us (R.G.) used to visit various groups of Sakai, who, like the Jakun and Temiars, are long-headed and possess straight hair. The Semang are Negritos and are thought to have some affinity with the now extinct Tasmanian aborigines. At the time of contact he tested 165 Sakai for their A B O blood groups, and it is thought that the results of his survey should be placed on record.

Group O and group B percentages are high, while that of group A is low. The gene frequency distribution $p = 0{\cdot}067$, $q = 0{\cdot}187$, and $r = 0{\cdot}734$ is unusual, and of the thousands of racial groups tabulated by Boyd (1939), only a few isolated tribes in Indonesia and Melanesia have a comparable distribution of blood-group frequencies. Whether these tribes have any affinities with the Sakai is not known.

Summary.

1. The blood groups, M–N and Rh types of 250 southern Chinese, Hak-kas, Cantonese and Hokkiens have been determined.

2. The group percentages were as follows: group O, 46·4; group A, 25·2; group B, 20·8; group AB, 7·6. All the 82 individuals of groups A and AB were found to belong to subgroups A_1 and A_1B respectively. Gene frequencies calculated from these figures were as follows: $p = 0{\cdot}165$, $q = 0{\cdot}139$, $r = 0{\cdot}681$.

3. The M–N type percentages were as follows: type M, 39·2; type MN, 47·6; type N, 13·2. From these the gene frequencies $m = 0{\cdot}630$ and $n = 0{\cdot}370$ were calculated.

4. Tests carried out with three anti-Rh and two anti-hr type sera showed that 58% of the samples were of phenotype Rh_1Rh_1, 5·6% were Rh_1Rh_0, 4·4% were Rh_2Rh_2, 0·8% were Rh_2Rh_0, 29·6% were Rh_1Rh_2, 0·8% were Rh_1Rh_z and 0·8% were Rh_0. From these the gene frequencies $R^1 = 0{\cdot}760$, $R^2 = 0{\cdot}195$, $R^o = 0{\cdot}04$, $R^z = 0{\cdot}005$, were calculated.

5. Seventy-one Chinese blood samples of group O were tested with anti-Le^a (Lewis) serum, and 11 (15·5%) gave positive reactions.

6. Thirty-three blood samples from Hak-kas were tested with an anti-P serum; 22 (66%) gave positive results. These results and those given for the Lewis antigen are subject to confirmation.

7. An Rh test on a visiting Filipino scientist has demonstrated for the first time that the gene R^z or R^y is present in the Filipinos.

8. The A B O blood groups of 165 Sakai of Malaya were determined some years ago by one of the authors (R.G.). The group percentages were as follows: group O, 54; group A, 10; group B, 31; group AB, 5·0. Gene frequencies calculated from these figures were as follows: $p = 0{\cdot}067$, $q = 0{\cdot}187$, $r = 0{\cdot}734$.

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THE EFFECTS OF SODIUM CITRATE IN LEAD POISONING AND LEAD ABSORPTION: LEAD ABSORPTION.

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THIS paper describes the results obtained in an investigation of the prophylactic use of sodium citrate by the employees of an accumulator factory.

The works concerned were new, and the employees (about 48) were, with few exceptions, all newcomers to any kind of lead hazard. The opportunity was taken of determining how the concentration of lead in the urine, the stippled cell count and the ratio of large lymphocytes *plus* monocytes to small lymphocytes increased as the magnitude of exposure increased, owing to increased atmospheric lead concentrations and increased time of exposure. Blood examinations and urinary lead determinations were made at intervals of about five weeks. These results are the subject of another paper (Shiels, 1950).

After the works had been in operation for several months, it was learned that the prophylactic use of sodium citrate by a number of the employees had commenced. The dose was four grammes in an ounce of water once per day.

Owing to circumstances not within the control of the writers, no controls were arranged for. It was thought, nevertheless, that useful information might be obtained from a study of the results of the laboratory tests before and after the institution of the citrate regime. Not all the employees were regular in taking the citrate, but this fact has enabled the array of persons to be divided into two groups, one consisting of those who took a majority of their doses during a selected period, and those who took a smaller number. The results found by this method of considering the effects will be discussed later.

It is emphasized in regard to the prophylactic use of this or any other agent that the ideal to be aimed at in the control of lead poisoning is the prevention of excessive absorption of lead. However, circumstances may arise in which the reduction of lead absorption cannot be achieved in a short time (the wearing of respirators is unpopular) owing to slow delivery of ventilating equipment and so on. In such circumstances it is considered legitimate to adopt for a time some prophylactic method of dealing with the lead that is being absorbed, while endeavouring by good housekeeping and general cleanliness to keep the absorption to the minimum which can be achieved with the existing equipment.

PROPHYLACTIC USE OF SODIUM CITRATE.

The medical officer of the battery works concerned decided, as many of the employees were showing rather too much lead absorption (although there were no cases of lead poisoning at the time when the use of citrate was commenced), to institute the taking of four grammes of sodium citrate once per day as a prophylactic measure.

The taking of citrate commenced on June 17, 1949. The next examinations after this date were on June 28 for some, and on July 12 for others. There were eight doses on working days between the dates June 17 and June 28 inclusive, and 18 doses between June 17 and July 12. Five of the men took only one or two doses in this period. They formed too small a group to act as a control group and have not been considered further.

Two methods have been adopted in order to show the effect of the citrate. The first is to compare the stippled cell counts and the ratio of large lymphocytes *plus* monocytes to small lymphocytes (called the cell ratio) at the three examinations before the taking of citrate commenced (June 17, 1949), with the figure found at the next examination after that date—that is, at the fourth examination. Practically all the persons examined had been employed at the works throughout the whole period extending from some weeks prior to the first examination to the fourth examination.

The ratio of monocytes *plus* large lymphocytes to small lymphocytes has been used as one criterion of the beneficial effects of sodium citrate, since it has been shown to be the best indication of the effects of lead (Ferguson and Ferguson, 1934; Shiels, 1937 and 1950).

The stippled cell counts were made on films stained by the technique of Sellers (1928), with the use of an oil immersion apochromatic objective, a light field, and a magnification of 900.

The cell ratios were determined in the way already described (Shiels, 1936, 1937, 1950).

The second method was to compare the effects on the stippled cell counts and on the cell ratio for those who took 75% or more of the doses, with the results for those who took less than this proportion, for the second or third examination and for the fourth. For each particular individual, the test made after June 17, 1949, has a corresponding test made before that date. The average number of doses in the first group up to the time when the appropriate examinations were made was ten, and for the second group four.

First Method.

Effects on the Stippled Cell Counts.

The total stippled cell counts and the coarsely stippled cell counts at the three examinations prior to June 17, and at the first examination after this date, are shown in Tables I and II. The first examination for some subjects was on March 29, 1949, for others on April 5, and for others again on April 12; the second was on May 11, May 12, and May 24; and the third was on May 24, June 10, and June 15. The fourth (that is, eleven and twenty-five days after the taking of citrate commenced) was on June 28 and July 12.

TABLE I.

Total Stippled Cell Counts per 1,000,000 Red Cells.

Range of Counts.	First Examination.		Second Examination.		Third Examination.		Fourth Examination.	
	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.
0 to 1000 ..	8	0·27	0	0·00	2	0·09	10	0·31
1001 to 2000 ..	7	0·23	2	0·09	4	0·17	11	0·34
2001 to 3000 ..	4	0·13	5	0·23	3	0·13	5	0·16
3001 to 4000 ..	4	0·13	3	0·14	4	0·17	4	0·13
4001 to 5000 ..	3	0·10	5	0·23	3	0·13	0	0·00
5001 to 6000 ..	1	0·03	5	0·23	4	0·17	0	0·00
6001 to 7000 ..	1	0·03	0	0·00	1	0·04	1	0·03
7001 to 8000 ..	1	0·03	0	0·00	0	0·00	0	0·00
8001 and over ..	1	0·03	2	0·09	2	0·09	1	0·03
Total number	30		22		23		32	
Average count	2846		4020		3856		1780	

The proportions of the class with counts up to certain ranges are shown graphically in Figure I.

The proportions of the class with counts up to certain ranges are shown graphically in Figure II.

Some of the subjects whose results appear in these tables were examined on all four occasions, some at the first, second and fourth examinations, some at the first, third and fourth examinations, some at the second, third and fourth examinations, one at the third and fourth examinations, and one at the first, second and third examinations, missing the fourth.

Table I indicates a pronounced change in the distribution of the total stippled cell counts after the taking of citrate commenced. Thus the proportions of the class with values below 3000 per 1,000,000 red cells were 0·63, 0·32, 0·38 respectively at the first, second and third examinations, all of which were before the taking of citrate started, and 0·81 at the fourth examination, which was eleven days after it started. The average values show a rise from the first to the second examinations, no significant change from the second to the third and a pronounced fall from the third to the fourth. That the fall in values from the third to the fourth examination was significant, is shown by the t value (Fisher, 1936) for the decrease.

There were 22 pairs of values for this comparison. The mean decrease was 2100 (the values being rounded off to the nearest 100), and the standard error was 491, giving a t value of 4·27. For an array of 21, a t value of 3·819 corresponds to a P value of 0·001. A t value of 4·27 corresponds to $P < 0·001$ and is highly significant. For the comparison between the second and fourth examinations there were nine pairs of values. The mean decrease was 2400 and the standard error 710, giving a t value of 3·38. This corresponds to a P value of 0·01. When $n = 8$, a t value of 3·35 corresponds to a P value of 0·01. Thus the above value is significant. If we compare the individual values at the fourth examination with the value at the third, or if there was no examination for a particular subject at this time, then with the value at the second examinations there are 31 pairs of observations for comparison. The mean decrease was 2200 and the standard error 384, giving a t value of 5·73. When $n = 30$ and $t = 3·646$, $P = 0·001$. Therefore P for the above array is $< 0·001$. The decrease in values is therefore highly significant.

Table II shows a pronounced change in the coarsely stippled cell counts at the fourth examination. The proportions of the class with values greater than 500 per 1,000,000 red cells were, at the first, second and third examinations, 0·17, 0·41 and 0·57, and at the fourth, only 0·09. The average values showed a pronounced rise from the second to the third and a pronounced fall from the third to the fourth. For 22 pairs of observations for the fall from the third to the fourth examinations, the mean decrease was 690 and the standard error 176, giving a t value of 3·97. When $n = 21$, a t value of 3·819 corresponds to a P value of 0·001. The above value therefore corresponds to a P value of $< 0·001$ and is therefore highly significant.

For the change between the second and fourth examinations the mean decrease was 310 for nine pairs of observations and the standard error 128·8, giving a t value of 2·406. When $n = 8$, a t value of 2·306 corresponds to a P value of 0·05 and a t value of 2·896 to a P value of 0·02.

TABLE II.

Coarsely Stippled Cell Counts per 1,000,000 Red Cells.

Range of Counts.	First Examination.		Second Examination.		Third Examination.		Fourth Examination.	
	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.
0 to 250 ..	23	0·77	12	0·55	9	0·39	28	0·88
251 to 500 ..	2	0·07	1	0·05	1	0·04	1	0·03
501 to 750 ..	2	0·07	5	0·23	3	0·13	1	0·03
751 to 1000 ..	1	0·03	3	0·14	3	0·13	0	0·00
1001 to 1500 ..	2	0·07	1	0·05	3	0·13	1	0·03
1501 to 2000 ..	0	0·00	0	0·00	2	0·09	1	0·03
2001 to 3000 ..	0	0·00	0	0·00	1	0·04	0	0·00
3001 to 4000 ..	0	0·00	0	0·00	1	0·04	0	0·00
Total number	30		22		23		32	
Average count	220		343		800		154	

TABLE III.
Cell Ratio.

Range of Cell Ratio.	First Examination.		Second Examination		Third Examination.		Fourth Examination.	
	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.
0 to 1·0 ..	1	0·03	0	0·00	0	0·00	0	0·00
1·1 to 2·0 ..	14	0·45	1	0·04	1	0·05	3	0·12
2·1 to 3·0 ..	10	0·32	2	0·08	2	0·10	14	0·56
3·1 to 4·0 ..	2	0·06	3	0·13	2	0·10	3	0·12
4·1 to 5·0 ..	1	0·03	5	0·21	2	0·10	4	0·16
5·1 to 6·0 ..	2	0·06	2	0·08	4	0·20	0	0·00
6·1 to 7·0 ..	0	0·00	1	0·04	4	0·20	1	0·04
7·1 to 8·0 ..	1	0·03	3	0·13	2	0·10	0	0·00
8·1 and over ..	0	0·00	7	0·29	3	0·15	0	0·00
Total number	31		24		20		25	
Average ratio	2·43		6·28		6·06		3·05	

The above value of 2·406 may be barely significant. The mean decrease between the second or third and the fourth examinations for 31 pairs of observations was 580 and the standard error 133, giving a t value of 4·36. This corresponds to a P value of $< 0·001$. There was therefore a highly significant fall.

Figures I and II show clearly the pronounced change in distribution of the stippled cell counts, and in the average values at the fourth examination. There was a pronounced change at the examinations made shortly after the taking of citrate began. Generally the coarsely stippled cell counts are more significant in regard to the deleterious effects of lead than are the finely stippled cell counts, and it is interesting to compare the percentage of coarsely stippled cells in the total counts at the four examinations. They are 7·7, 8·5, 20·7, and 8·7, at the first, second, third and fourth examinations respectively.

There was thus an increase in the percentage of coarsely stippled cells as exposure increased from the first to the third examinations, and then at the fourth examination, which took place after the citrate regime had been in operation for a minimum period of eleven days, a rapid reversion to about the earlier values.

Effects on the Ratio of Large Lymphocytes plus Monocytes to Small Lymphocytes.

Table III shows the cell ratio above-mentioned found at the four examinations.

The proportions of the class with cell ratios up to certain ranges are shown graphically in Figure III.

Table III shows a pronounced rise in average values from the first to the second examination, no significant change between the second and third examinations, and a pronounced fall between the third and fourth.

The proportions of the class with cell ratios above, say, 4·0, were respectively 0·13, 0·75 and 0·75, at the first, second and third examinations, and 0·20 at the fourth.

The numbers of individual results considered in the third and fourth examinations are not the same as for the stippled cell counts. The reason for this is that the taking of citrate in the case of a person who has a low cell ratio due to the effect of too much lead causes an increase in the cell ratio. This has been amply demonstrated in a previous paper (Shiels, Thomas and Palmer, 1950). There were five subjects to whom this description applied at the time of the third examination. The effect of the citrate in all these cases was to cause an increase in the ratio as determined at the fourth examination. These results have been excluded in determining the decrease between the third and fourth examinations. The results of two other persons were excluded, one because of the exceptionally high cell ratio, and one because of a change of work to being a leading hand with much decreased exposure, which resulted in a substantial rise in his cell ratio; this latter person took only three doses.

TABLE IV.
Total Stippled Cell Counts per 1,000,000 Red Cells.

Range of Count.	Class A.				Class B.			
	Before.		After.		Before.		After.	
	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.
0 to 1000 ..	1	0·05	6	0·20	3	0·19	6	0·38
1001 to 2000 ..	5	0·25	10	0·50	2	0·13	1	0·06
2001 to 3000 ..	3	0·15	1	0·05	3	0·19	5	0·31
3001 to 4000 ..	4	0·20	2	0·10	2	0·13	3	0·19
4001 to 5000 ..	2	0·10	0	0·00	1	0·06	0	0·00
5001 to 6000 ..	2	0·10	0	0·00	3	0·19	0	0·00
6001 to 7000 ..	0	0·00	1	0·05	1	0·06	0	0·00
7001 to 8000 ..	0	0·00	0	0·00	0	0·00	0	0·00
8001 and over ..	3	0·15	0	0·00	1	0·06	1	0·06
Total number	20		20		16		16	
Average count	3850		1675		3475		2325	
Decrease in average count	2175				1150			

TABLE V.
Coarsely Stippled Cell Counts per 1,000,000 Red Cells.

Range of Count.	Class A.				Class B.			
	Before.		After.		Before.		After.	
	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.
0 to 250 ..	11	0·55	19	0·95	1	0·06	14	0·88
251 to 500 ..	0	0·00	0	0·00	7	0·44	0	0·00
501 to 1000 ..	6	0·30	0	0·00	5	0·31	1	0·06
1001 to 1500 ..	2	0·10	0	0·00	0	0·00	1	0·06
1501 to 2000 ..	1	0·05	1	0·05	1	0·06	0	0·00
2001 to 2500 ..	0	0·00	0	0·00	1	0·06	0	0·00
2501 to 3000 ..	0	0·00	0	0·00	0	0·00	0	0·00
3001 and over ..	0	0·00	0	0·00	1	0·06	0	0·00
Total number	20		20		16		16	
Average count	470		130		722		142	

For the decreases in the cell ratio between the corresponding examinations, t values have been calculated. Between the third and fourth examinations, for 15 pairs of observations the t value was 4·34. When $n = 14$, and $t = 4·04$, the corresponding P value is 0·001. For the value 4·34, therefore, the P value is $< 0·001$ and the decrease is highly significant.

Similarly the t value for decrease between the second and fourth examinations for nine pairs of observations was 5·23; the corresponding P value is $< 0·001$.

The t value for 24 pairs of observations for the decrease between the second or third and the fourth examinations was 6·32 and the corresponding P value $< 0·001$. When $n = 23$ and $t = 3·767$, P is 0·001. The decrease was therefore highly significant.

There was no significant rise or fall in the cell ratio between the second and third examinations.

Second Method.

Effects on Stippled Cell Counts.

Table IV shows the distribution of the total stippled counts for the group who took 75% of their doses (called *A*), and for the group who took less than that number (called *B*), before and after the citrate regime started.

The proportions of the class with counts greater than a certain range are shown in Figure IV.

Table IV shows a considerably greater alteration in the total stippled cell counts "before" and "after" for class *A* than for class *B*. Thus the proportion with counts below 2000 per 1,000,000 red cells changed from 0·30 to 0·80 for class *A* and from 0·31 to 0·44 for class *B*. Nineteen out of the 20 subjects in class *A* showed a decrease in the total stippled cell counts for the two examinations, whereas out of the 16 persons in class *B*, nine showed a decrease and seven an increase in these counts.

The mean decrease for class *A* was 2200 and the standard error 386, giving a t value for the 20 pairs of observations for class *A* of 6·18. When $n = 19$ and $t = 3·883$, the corresponding P value is 0·001. When $t = 6·18$, the corresponding P value is $< 0·001$. There was therefore a highly significant fall in the total stippled cell counts for class *A*.

For the 16 pairs of observations in class *B* the mean decrease was 1200 and the standard error 658·8, giving a t value of 1·821. When $n = 15$ and $t = 2·131$, $P = 0·05$. Thus the t value of 1·821 indicates that there was no significant fall in the total stippled cell counts for class *B*.

Table V shows the distribution of the coarsely stippled cell counts for class *A* and class *B* before and after the commencement of the citrate regime.

The proportions with coarsely stippled cell counts greater than a certain range are shown in Figure V.

There was a larger fall in the average counts for class *B* than for class *A*, but this was mostly due to three subjects

TABLE VI.
Cell Ratio.

Range of Ratio.	Class A.				Class B.			
	Before.		After.		Before.		After.	
	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.	Number in the Group.	Proportion of the Class.
0 to 1·0 ..	0	0·00	0	0·00	0	0·00	0	0·00
1·1 to 2·0 ..	2	0·12	2	0·12	0	0·00	0	0·00
2·1 to 3·0 ..	1	0·06	9	0·53	0	0·00	6	0·50
3·1 to 4·0 ..	1	0·06	3	0·18	2	0·17	0	0·00
4·1 to 5·0 ..	2	0·12	2	0·12	4	0·33	2	0·17
5·1 to 6·0 ..	3	0·18	0	0·00	1	0·08	2	0·17
6·1 to 7·0 ..	2	0·12	1	0·06	3	0·25	0	0·00
7·1 to 8·0 ..	2	0·12	0	0·00	0	0·00	1	0·08
8·1 and over ..	4	0·24	0	0·00	2	0·17	1	0·08
Total number	17		17		12		12	
Average ratio	6·19		3·16		5·91		4·30	

TABLE VII.

Lead in Air. (*Milligrammes per Cubic Metre.*)

Operation.	10/2/49.	30/3/49.	10/6/49.	16/6/49.	30–31/8/49.	23–24/11/49.
Lead pot casting posts and links	0·24	—	0·41	—	0·35	0·26
Plate separation	0·19	—	0·28	—	0·21	0·06
Group burning	0·14	—	0·43	—	0·28	0·21
Group assembly and burning	0·14	—	0·33	—	0·28	0·23
Boxing	0·21	—	0·26	—	0·21	0·42
Inspections of groups	0·17	—	0·17	—	0·14	0·17
Burning posts and links	0·12	—	0·21	—	0·20	0·16
Pasting machine	—	0·20	—	0·22	0·56	0·63
Trimming pasted plates and packing	—	0·23	—	0·08	0·35	—
Mixing	—	0·18	—	1·33[1]	0·28	0·28
Plate cutting	—	0·28[2]	—	0·73[3]	0·77	0·87
Grid casting	—	0·17	—	0·19	0·21	0·35
Finishing	—	—	—	0·63	0·10	0·38
General air during cleaning (short period)	—	—	0·92	0·35	—	—

[1] This air sample was taken well in above the mixer. A mask was worn by the operative. The other tests for this operation were made in the breathing zone of the operative.

[2] One machine.

[3] Two machines.

in class *B* who showed fairly high counts (2120, 1890 and 3730 per 1,000,000 red cells). They took respectively five, four and four doses, and were found to have considerably lower counts at the examination after this taking of citrate. Statistically the fall in the counts was more significant for class *A* than for class *B*. For the 20 subjects in class *A* the mean decrease was 349, the standard error was 116 and the *t* value was 2·905. When $n = 19$ and $t = 2{\cdot}86$, the corresponding *P* value is 0·01. The value of *t* of 2·905 corresponds to *P* value $< 0{\cdot}01$, and there was therefore a significant fall in the coarsely stippled cell counts.

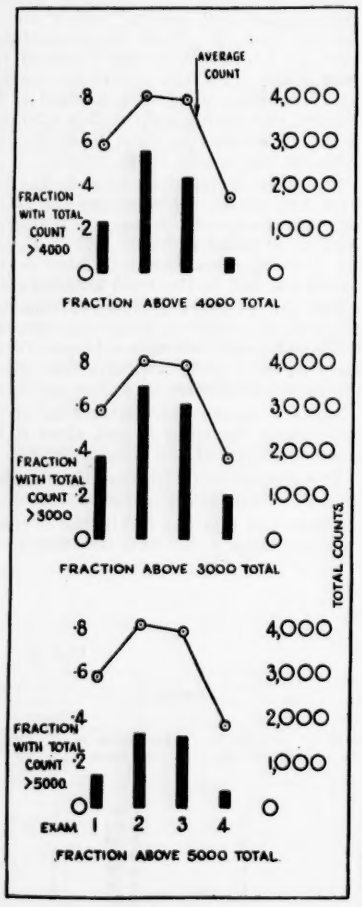
AVERAGE COUNT
FRACTION WITH TOTAL COUNT >4000
FRACTION ABOVE 4000 TOTAL
FRACTION WITH TOTAL COUNT >3000
FRACTION ABOVE 3000 TOTAL
TOTAL COUNTS
FRACTION WITH TOTAL COUNT >5000
EXAM 1 2 3 4
FRACTION ABOVE 5000 TOTAL

FIGURE I.

For class *B* the mean decrease was 580, the standard error 225 and the *t* value 2·577. When $n = 15$ and $t = 2{\cdot}60$, the *P* value is 0·02. When $t = 2{\cdot}577$, the *P* value was somewhat greater than 0·02. The fall therefore was not so significant as for class *A*.

Figures IV and V show the greater effects on the total stippled cell count and the coarsely stippled cell counts in class *A* than in class *B*.

Effects on Values of the Ratio for Class A and Class B.

Table VI shows the cell ratios for class *A* and class *B* before and after the commencement of the citrate regime.

The proportions of each class with cell ratios greater than a certain range are shown in Figure VI.

The number of observations used in these comparisons is less than those used for the stippled cell counts, for reasons already indicated in describing the results of the first method of comparison. Thus, one man in class *B* changed to a job with much less exposure, one had an exceptionally high stippled cell count, and one who had had too much lead showed an increased cell ratio at the "after" examination. He had taken five doses. If these cases had been included, the average value for "after" would have been greater than for "before" in class *B*.

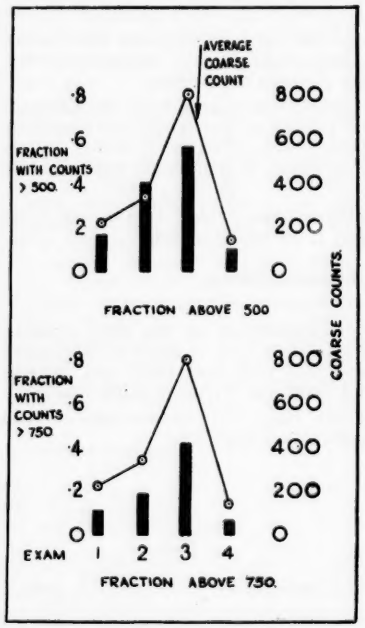

FIGURE II.

It is clear from an inspection of Table VI that the decrease in the ratio at the "before" and "after" examinations was much greater for class *A* than for class *B*. There were 13 substantial falls and four slight rises in this class.

The mean decrease for class *A* was 3·03, the standard error was 0·644 and the *t* value 4·658. When $n = 16$ and $t = 4{\cdot}015$, the *P* value is 0·001. Thus the *t* value of 4·658 corresponds to a *P* value of $< 0{\cdot}001$, and the fall is therefore highly significant. For class *B* the mean decrease was 1·61 and the standard error 0·838, giving a *t* value of 1·92. When $n = 11$ and $t = 2{\cdot}201$, the corresponding *P* value is 0·05. The above *t* value therefore corresponds to a *P* value $> 0{\cdot}05$. The fall in the cell ratio in class *B* is therefore not significant.

There were four considerable falls and four considerable rises in the ratio in class *B*, three of these falls being for subjects who took four or five doses.

DISCUSSION.

All the stippled cell counts and the determinations of the cell ratio were made by the senior author (D.O.S.), so the question of variation of results due to different observers does not arise.

In regard to the prophylactic use of sodium citrate, it has been established that there was a significant fall in the total stippled cell counts and in the coarsely stippled cell counts between the examinations before and after the commencement of the citrate regime, and in the cell ratio.

The only other factor which could account for this effect was a possible considerable change in the lead hazard. There is fairly definite evidence that such a change did not occur.

This is furnished by the results of the air analyses for lead. While these were not made so frequently as the laboratory tests on subjects, they indicate that there was probably no significant change in the over-all exposures during the periods concerned. The results of air analyses are shown in Table VII.

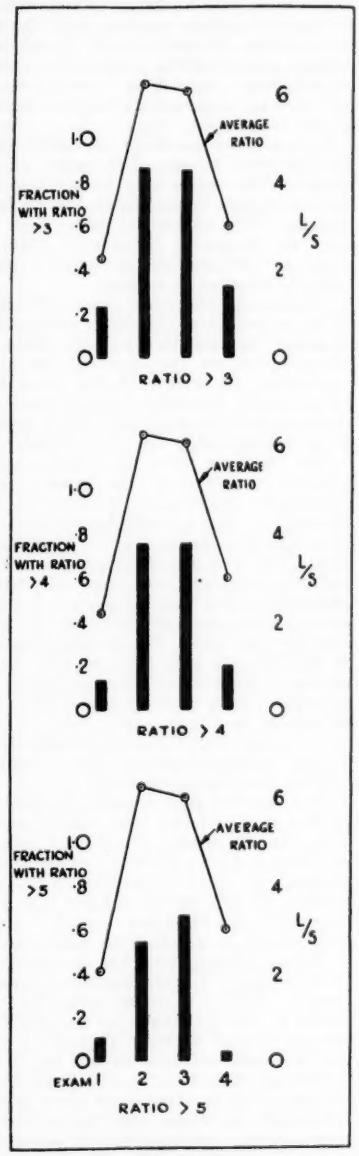

FIGURE III.

The August air examinations were made eleven weeks after the June examinations, and show a drop from an average lead content of 0·33 milligramme to 0·28 milligramme per cubic metre.

These results indicate that it is extremely unlikely that there was any significant fall in the concentrations of lead in air at the time when the fourth blood examinations were made. These were made about two and three and a half weeks after the June air examination. Statistically, such a fall as occurred is not significant.

The decrease in the cell ratio which followed the commencement of the taking of citrate might be explained by several hypotheses. It might have been due to the bodily response to lead being overcome by too much lead, and to the persons concerned being in or approaching the condition in which lead poisoning is imminent. It might have been due to sudden decreased exposure to lead. The other hypothesis is that it was due to the beneficial action of the citrate in increasing the elimination of lead, or in converting a significant fraction of the circulating lead into a relatively inactive form, or in both directions.

That the first hypothesis is untenable is shown by the clinical conditions of the persons concerned, the decrease in their stippled cell counts, and their subsequent history. Had they been deteriorating in clinical condition, their stippled cell counts would, on the whole, have risen above the moderate counts found, instead of falling.

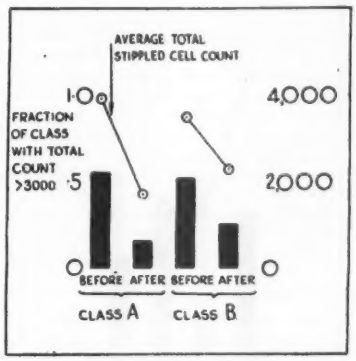

FIGURE IV.

That the second hypothesis is untenable is shown by the fact that there was no significant decrease in exposure as evidenced by the atmospheric lead concentrations.

That the citrate was responsible for the effects is shown by the fact that the group which took the larger number of doses showed very significant improvement in the results of laboratory tests, whereas the group which took only a few doses showed no such significant changes.

It is clear, then, that the citrate was the cause of the decreased cell ratio. It was also the cause of the decreased stippled cell counts.

In previous papers (Ferguson and Ferguson, 1934; Shiels, 1936, 1937, 1950, and Shiels, Thomas and Palmer, 1950), the relationship of the cell ratio to the clinical condition and to increasing absorption of lead has been discussed.

In a previous paper (Shiels, Thomas and Palmer, 1950) an increase in the cell ratio was used as a criterion of the beneficial effect of sodium citrate, whereas in this paper a decrease in the value of the ratio is used for the same purpose. This involves no contradiction, since in the former instance the patients were suffering from lead poisoning and initially had low cell ratios, whereas in the latter instance the subjects considered were not lead poisoned but were, or some of them were, showing greater urinary lead excretion and higher stippled cell counts than the medical officer thought should be permitted to continue. They all had cell ratios well over 2·0 before the taking of citrate began. Although some of them would probably have suffered from lead poisoning if they had continued working in the same conditions, their period of work in these conditions had not been sufficiently long to cause them to suffer from lead poisoning with the characteristic low cell ratios.

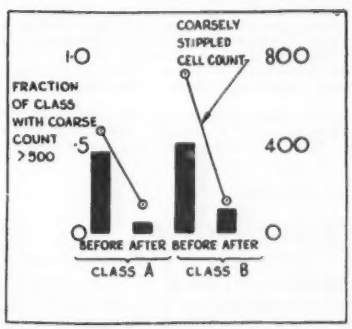

FIGURE V.

The effect of the citrate was to cause their condition to revert to about the condition they were in after a month or six weeks from the commencement of the factory. Thus the prophylactic use of the citrate undoubtedly caused a rapid improvement in the results of the laboratory tests of persons who were still exposed to a hazard which did not significantly alter after the use of the citrate commenced.

SUMMARY.

1. The prophylactic use of sodium citrate in oral doses of four or five grammes in one ounce or two of water once per day, by persons exposed to lead hazard, is useful, and may be justified in certain circumstances. Such use is not to be regarded as an alternative to improving the conditions respecting exposure to lead.

1. It caused a significant fall in stippled cell counts, and in the ratio of monocytes *plus* large lymphocytes to small lymphocytes, in persons exposed to lead hazard, but not showing symptoms of lead poisoning.

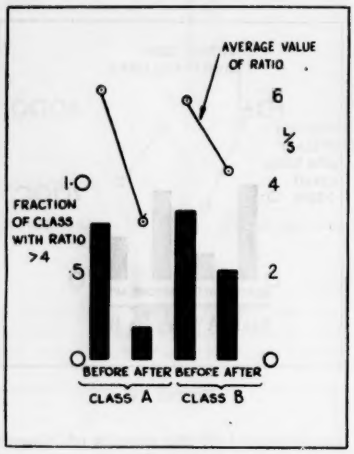

FIGURE VI.

ACKNOWLEDGEMENTS.

Acknowledgements are gratefully rendered to Dr. A. Christophers, B.Sc., for his interest in the work, to Associate Professor M. H. Belz, Associate Professor of Mathematical Statistics at the University of Melbourne, for his advice as to statistical treatment, and to Miss L. B. Blair for preparing the diagrams.

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BRONCHIAL CARCINOMA.[1]

By COTTER HARVEY,

Sydney.

THERE is no doubt whatever that bronchial carcinoma is steadily increasing in frequency, and that we do not merely see more cases because we are looking for them. In males, it is exceeded in frequency only by gastric carcinoma. Between 6% and 8% of all carcinomata are bronchogenic. The frequency with which they appear in my practice is a source of great concern, as we are so rarely able to do anything for the patients. By the time a diagnosis is established, most of them are beyond the aid of surgery, which nearly always means that they are beyond help.

How can we make an earlier diagnosis? There are two important educational possibilities. Firstly, we must educate the public, particularly that steadily increasing proportion of it in the "cancer age", to consult the physician in the presence of a cough which persists for more than a month. Secondly, we must educate physicians and general practitioners to have an X-ray picture taken of the chest of any patient with symptoms that could be related to the respiratory system. I think the day is not far distant when every patient who consults a doctor for anything will have his or her chest radiologically examined. However that may be, there is no question about the paramount responsibility of the radiologist.

In the great majority of cases, bronchial carcinoma is first detected by the observation of a radiological abnormality. The lesion may be indeterminate, or masked, but the radiologist must sound the alarm if he has any suspicions. The possibility of a cure by radical operation must be always in his mind. This is no mere academic problem: the need for a definite diagnosis at the earliest possible moment is crucial.

An absolute diagnosis is not, of course, the responsibility of the radiologist. However competent he may be, he can probably be definite in only about 50% of cases, and perhaps suggest the diagnosis in another third. Of the remainder, he will probably miss 10% entirely, pleural effusion will frustrate him in some, and occasionally the clinician will present him with a proven case in which the X-ray appearances are yet normal.

The clinician may have his suspicions or he may be entirely unaware of the lesion. Most doctors are not sufficiently carcinoma-conscious in cases of respiratory disease. If you as radiologists have any suspicion that a bronchial carcinoma may lurk behind the "projected pathology" that you are studying, you should communicate it to the clinician, and you must not mind if you are dubbed alarmists. The patient need not know it, but suspicions once aroused must be dispelled or confirmed at the earliest possible moment. The problem may be a simple one, or it may be that only lapse of time will provide an absolute answer. Mention of the time factor prompts me to ask a question: have any of you ever seen a report couched somewhat in these terms? "There is an irregular opacity in the right lower zone, probably due to unresolved pneumonia. Suggest further X-ray examination in two months' time to exclude carcinoma."

The day has passed when the radiologist can be the sole arbiter of a patient's fate. Such a report imposes a needless delay in diagnosis, which may cost the patient his life. If you are sure carcinoma of the lung is present, you are entitled to state it, and it is unlikely that you will be wrong. If you merely suspect this, you should put the ball back into the clinician's court. "Further investigation is warranted", might be your comment, and it is up to him.

Before telling you what he should do about it, I should like to quarrel with another phrase in my hypothetical report. It is a common radiological diagnosis, one of the banes of my existence as a chest clinician, because it is nearly always wrong. Perhaps I should rather say that in the cases referred to me it has always turned out to be wrong, and that is why I see these patients. I refer, of course, to that unhappy term, so often the refuge of the clinically destitute and backed by radiological opinion, "unresolved pneumonia". I am well aware that delayed resolution is not uncommon, and you all see it, but that is something different. Unresolved pneumonia is not an adequate diagnosis, and there is some underlying disease process which needs to be unmasked. In young people it is most often due to tuberculosis or bronchiectasis, while in older folk the commonest cause is bronchial carcinoma. You may disagree; but I would suggest that you ponder deeply before offering any person over middle age the apparently simple, but probably pseudo, diagnosis of "unresolved pneumonia".

Further investigation, then, is agreed upon. This is a wide field, and I can mention only three procedures. Next to X-ray examination, the most important definitive procedure in the diagnosis and evaluation of lung cancer is bronchoscopy. The bronchoscope is part of the armamen-

[1] Read at a meeting of the College of Radiologists (Aust. and N.Z.) on December 13, 1949.

tarium of all modern thoracic specialists, both physicians and surgeons, and bronchoscopy is an essential step in the appraisal of many cases. However, bronchoscopic biopsy will not give more than about 40% positive yield, while in perhaps a further 20% of cases bronchoscopic evidence of malignant disease will be revealed, such as widened carina, a rigid bronchus or distortion; in most cases these latter findings indicate inoperability.

In an endeavour to obtain an earlie diagnosis, recently in America attention has been focused on the examination of the sputum, or of secretions obtained through the bronchoscope, for malignant cells. The work of Papanicolaou on vaginal secretions gave impetus, and now several clinics claim highly successful results from the study of sputum cytology. To give just one example, Woolner and McDonald (1950) from the Mayo Clinic have reported the finding of cancer cells in 400 cases, later proven histologically, with only seven "false positive" results, and Clagett, one of their thoracic surgeons, has stated that sputum examination offers a positive diagnosis in 90% of cases. He quoted some impressive figures to a meeting of the Mayo Clinic which I was privileged to attend in 1948. Previously he had found that in one-third of the cases he was compelled to perform a thoracotomy for an undetermined lesion. In his last 30 cases, however, he had only two such operations. At the Mayo Clinic, diagnostic thoracotomy is now a rarity, the responsibility having shifted from the surgeon to the pathologist. I have been endeavouring in Sydney to have this important technical advance studied in several hospitals, and progress is being made. But it is difficult and requires special training.

For the time being we shall have to rely often on the third method of diagnostic attack—namely, thoracotomy. In experienced hands, this carries little more risk than an exploratory laparotomy, and the clinician must not shrink from advising it. It often means, however, that the lesion is not merely incised, it is excised. If there is a lump in the lung the lung should be removed, if this is technically possible. This may mean that a simple inflammatory lesion is removed; but surely it is a happy outcome and no apology is required. In many cases, to quote an editorial in THE MEDICAL JOURNAL OF AUSTRALIA (1949), ". . . the hope of an early diagnosis, and of a surgical cure, will rest on exploratory thoracotomy following the finding of suspicious radiological appearances". Recent advances in thoracic surgery have raised the status of pneumonectomy from a dramatic and desperate affair to a standard procedure. It is agreed that the resectability rate for bronchial carcinoma should be about 30%, though I fear it is still below this in our country; we are not yet diagnostically alert enough. A leading American thoracic surgeon, Alton Ochsner (1948), found that of 181 patients submitted to resection, 99 survived six months or more and 58 more than twelve months, while 11 or 7·7% were alive at the end of five years. These and other figures which are comparable reveal one important fact—namely, that the survival rate for bronchial carcinoma is higher than that for gastric cancer.

Our thoracic surgeons are slowly improving their statistics, but they must be given better material.

The varying radiological techniques, such as the taking of lateral and oblique views, the use of the Potter-Bucky diaphragm, tomography and the like are beyond my scope. However, I should like to comment briefly on mass radiography, which must surely in times to come give a reasonable yield of operable lung tumours. Mason (1949) has recently stated his disappointment at the results of his English experience. In 1948 I happened to be in Minneapolis about three months after they had concluded a mass X-ray survey of that city. They had examined over 300,000 inhabitants, of whom 26 had proven bronchial carcinoma, while 55 were still under investigation. I do not know how many proved to be operable, but these figures seem to me to be significant and worth while.

In this respect mention must be made of the subjects without symptoms but with X-ray evidence; they are becoming a real problem, and here education is badly needed, in order that patients may be persuaded to submit to investigations, and if need be to thoracotomy. Education is just as necessary for the medical attendant: how many would agree to the performance of an operation on a symptomless person? And yet it is obviously this group that will give the best surgical results.

I would stress that investigation must not be prolonged. The patient with a possible bronchial carcinoma should be admitted to hospital urgently, preferably in the care of a thoracic unit. Four weeks should be an adequate study period in most cases. At the end of this time, if the diagnosis has not been ruled out, and if the patient is a fair operative "risk", then thoracotomy should be performed, with the patient and staff prepared for pneumonectomy. This, of course, presupposes judgement and experience in the personnel of the thoracic team: they must be specialists. Mistakes will be made occasionally and a needless operation performed, but many lives will be saved that would otherwise be lost by inactivity. It is as true now as when I wrote it fifteen years ago (Harvey, 1936), that "the only cure for a tumour of the lung is its removal by the surgeon's knife".

Summary.

1. Bronchial carcinoma is one of the commonest forms of cancer, and its incidence is steadily increasing.

2. Education both of the medical profession and of the public is necessary if earlier diagnoses are to be made.

3. In the majority of cases, the radiologist must give the lead.

4. This is then taken up by the pathologist through (*a*) bronchoscopy and (*b*) study of sputum cytology.

5. Thoracotomy is a standard diagnostic procedure.

6. A small but steadily increasing percentage of cures is being achieved by radical resection—namely, pneumonectomy.

7. Specialized teams working as thoracic units are the means whereby advances will be made in the future in the diagnosis and treatment of bronchial carcinoma.

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CHEMOTHERAPY IN PULMONARY TUBERCULOSIS.[1]

By R. MUNRO FORD,
Adelaide.

IN this paper I wish to summarize the recent trend of chemotherapy in pulmonary tuberculosis.

Remarkable diversity of opinion has existed, since the advent of rational chemotherapeutic measures to combat the disease, concerning the "best regime" that should be used. Naturally a standard regime cannot meet the requirements of each kind of disease; but I believe that the drugs at present at our disposal should be allotted a more specific place in the management of each tuberculous patient.

At the present time we have at our disposal streptomycin and dihydrostreptomycin, para-aminosalicylic acid, the sulphone group of drugs and perhaps neomycin and the thiosemicarbazone group of drugs.

[1] Read at a meeting of the Section of Public Health, Tuberculosis, Tropical Medicine and Industrial Medicine, Australasian Medical Congress (British Medical Association), Seventh Session, Brisbane, May-June, 1950.

In 1944 Schatz and Waksman established the sensitivity of *Mycobacterium tuberculosis* to streptomycin; since that time extensive trials of this drug and of dihydrostreptomycin (isolated in 1946 by Peck and his co-workers) have been carried out.

The clinical use of streptomycin to date has been dictated to a large extent by protocols issued from time to time by various groups of workers. Its acceptance in the treatment of pulmonary tuberculosis has been chiefly in tracheobronchial and acute exudative disease.

The method of administration of the drug has varied from the original dose of three grammes of streptomycin given daily by the intramuscular route, to two grammes given weekly, and from injections given four times daily to once weekly over periods of time from eighteen to four weeks' duration.

The two main objections to the general use of the drug have been its production of toxic effects and the emergence of streptomycin-resistant strains during therapy; this latter fact has assumed (in the eyes of many physicians) such malignant proportions that they have been loath to use the drug except in the treatment of very few selected patients.

Tucker (1949) has reviewed the effects of streptomycin in the treatment of pulmonary tuberculosis in approximately 2000 cases, in which seven different streptomycin regimes have been used. He concluded that, used alone, one gramme per day given intramuscularly for forty-two days appears satisfactory in the early control of the disease and in the reduction of toxicity and emerging resistant strains. He also concluded that a dosage of 0·5 gramme given each day for one hundred and twenty days was statistically as satisfactory as other regimes in the degree of X-ray improvement and in the prevention of subsequent relapse, but did not prevent the emergence of a high percentage of streptomycin-resistant strains.

The mode of action of streptomycin is as yet not fully understood; but Garrod (1948) has shown that it is bactericidal in high concentrations and bacteriostatic in low concentrations against the actively growing tubercle bacillus.

Feldman (1946) stated that the effect of streptomycin was not dependent on constant blood levels ensured by frequent injections. Deyke and his co-workers (1949) maintained that the use of two grammes in one injection every three days gave clinical and radiological results equal to a daily dosage of one or two grammes administered over similar periods of time, without significant toxic reactions to the drug, and with noticeable reduction in the emergence of streptomycin-resistant strains. They have postulated that the latter result may be brought about by intermittent interruption of the life cycles of the tubercle bacilli, rendering them incapable of that form of adaptation required to develop streptomycin resistance, which they may well do in the presence of a constant streptomycin blood level. This bi-weekly regime has since been advocated by numerous workers (Tempel and Dye, 1949; Bogin, 1949).

The main usefulness of dihydrostreptomycin appears to be in its reduction in neurotoxic complications during treatment with high doses. However, with the present trend in intermittent doses of streptomycin and the doubt concerning its equal efficacy against the tuberculous lesions themselves, dihydrostreptomycin has not as yet supplanted the more generally used streptomycin.

The question of drug resistance appears to have been answered by the use of synergistic drugs given with streptomycin. It has been shown that a combination of bacteriostatic agents delays the emergence of drug-resistant strains (Karlson *et alii*, 1949; Dunner *et alii*, 1949). Of these, para-aminosalicylic acid appears to be the drug of choice.

Para-aminosalicylic acid (PAS) was first used by Lehmann (1946) in 1943, and then by other workers, in extensive clinical trials against tuberculosis.

PAS appears to have a beneficial action on similar types of pulmonary disease to those affected by streptomycin—in acute exudative disease, and in the reduction of fever, cough and sputum. Sweany *et alii* (1949) have also found that PAS favourably influences the regression of tension cavities in tuberculosis. Dempsey and Logg (1947) have shown that PAS is effective in tuberculous empyemata when locally instilled into the pleural cavity.

Lehmann (Vallentin *et alii*, 1950) has noticed a rise in erythrocyte sedimentation rate following temporary cessation of therapy with PAS, and advocates continuous high blood level therapy without rest periods.

The drug can be administered by mouth in the form of a sodium salt mixture which is rapidly absorbed, in enteric coated granules and in tablet form, and is given in a daily dosage of 12 grammes in four or six divided doses. It gives rise to few toxic effects, the most formidable of which are transient nausea and diarrhœa. Other toxic symptoms are rare, but include jaundice and punctate erythematous eruptions which are possibly due to the salicylic radicle of the compound PAS (Kierland and Carr, 1949).

The emergence of strains of tubercle bacilli resistant to PAS during treatment by the drug alone has also been described by numerous workers (Eastlake and Barach, 1949; Karlson *et alii*, 1949).

The mode of action of PAS appears to be bacteriostatic and specific for the tubercle bacillus. It suppresses the growth of the bacillus by reducing oxygen uptake and by neutralizing para-aminobenzoic acid necessary for the nutriment of the bacillus.

In reviewing 250 streptomycin-treated patients receiving a daily dosage of 0·5 to 1·0 gramme for from thirty to one hundred and twenty days, we have found similar results to most workers. We have also found that by early administration of the drug relapse rates in early and minimal disease have been considerably reduced, and that when it is used early in acute or chronic disease, almost immediate symptomatic benefit has been obtained. Four patients have discharged streptomycin-resistant tubercle bacilli in their sputum. Each of these patients at that time failed clinically to respond to the drug. Since using a combination of streptomycin and PAS with bed rest we have had no streptomycin-resistant or PAS-resistant strains. The main clinical benefit in our use of PAS has been its ability to reduce the amount of sputum. We have found that the sodium salt given in the form of a mixture is best tolerated, and have observed no serious toxic symptoms from the use of this drug. We have also found that intrapleural instillations of 10 millilitres of a 20% PAS solution every alternate day have produced the best results in "closed" tuberculous empyemata.

Thus PAS used in conjunction with streptomycin appears to delay the emergence of streptomycin-resistant or PAS-resistant strains. This widens the indications for their use and perhaps allows prolongation of treatment of the disease. Also the combined action of PAS and streptomycin on the tuberculous lesions themselves appears to be more beneficial than the action of either drug used alone (Karlson and Feldman, 1949). It thus appears that a combination of these drugs produces a summation of their good effects and a diminution of their bad effects.

Promin (of the sulphone group) is a drug which also appears synergistically to delay emergence of streptomycin-resistant strains. It also appears to influence more favourably chronic pulmonary disease in which prolonged bacteriostasis promotes healing. Its relative toxicity, however, has precluded its general use.

Tibione or "Conteben" (of the thiosemicarbazone group) was shown by Domagk *et alii* (1948) to be an effective agent against *Mycobacterium tuberculosis*, and for the past few years has undergone extensive clinical trials in Europe. It can be administered orally in small doses and appears to have a rather similar clinical effect to PAS. This drug also appears to be more effective in the chronic type of disease than either PAS or streptomycin. However, it also gives rise to undesirable toxic effects. Its mode of action appears to be a direct one on the tubercle bacillus itself by altering its morphological and staining properties, the latter precluding recognition of such bacilli by other means than by fluorescent microscopy.

Neomycin has so far appeared too toxic to humans to permit clinical trials.

Before their use is discussed, it is interesting to study the action of these drugs on the tubercle bacillus itself. This is shown in Table I.

TABLE I.
Action of Drugs on the Tubercle Bacillus.

Streptomycin.		PAS.	Promin.	Tibione.
In High Concentration.	In Low Concentration.			
Bactericidal.	Bacteriostatic.	Diminishes oxygen uptake. Neutralizes para-aminobenzoic acid.	Neutralizes para-aminobenzoic acid.	Causes morphological changes in the bacillus (? bactericidal).

From this it is conceivable that a combination of two or more of these drugs may effectively and permanently counteract active human tuberculosis.

The main complications in the use of streptomycin have been toxicity and drug-fastness; but with the use of intermittent doses and combination with PAS these have ceased to be factors prohibiting its effective use.

The weakness in our chemotherapeutic attack appears to be the likelihood of relapse due to the reappearance of "suppressed" bacilli following cessation of treatment, the main causes of which, in the absence of drug-fastness and chronic disease unsuitable for any active treatment, are the following: (i) unnecessary delay in instituting chemotherapy in suitable cases; (ii) failure to institute early collapse or excision therapy in cases unlikely to benefit permanently from chemotherapy alone; (iii) inadequate dosage and duration of treatment.

The Uses of Chemotherapy.

Chemotherapy is administered to a patient suffering from pulmonary tuberculosis for three reasons: (i) for active treatment, (ii) for palliative treatment, (iii) for prophylactic treatment.

Active Treatment.

I maintain that active treatment should be given in all cases of the following types of pulmonary disease: (*a*) minimal disease, (*b*) acute or acute on chronic disease, (*c*) tracheo-bronchial disease.

Minimal Disease.—It is well known that mobile minimal disease usually responds favourably to bed rest therapy alone. However, in a certain percentage of cases it does not do so. Streptomycin and PAS should be administered as early as possible, as these drugs exert their best effect during the earliest vascular phase before the disease has had time to wall itself off and thus prevent them from reaching the nidus of the infection where the bacilli can lurk undisturbed. It seems that two grammes of streptomycin given twice weekly and twelve grammes of PAS given in divided doses daily for periods ranging from sixty to one hundred and twenty days have a combined effect on the progress of this disease, equal, if not superior, to any other régime.

Acute or Acute on Chronic Disease.—Similarly, streptomycin and PAS should be administered at an early date in all acute exudative types of pulmonary disease with or without the coexistence of chronic disease. The effect on the toxic symptoms of this disease, cough, sputum and breathlessness, are often dramatic, and often too little emphasis is placed on this human aspect of treatment, which is of major importance in initiating the confidence of the patient, and in helping the prevention of dissemination. By early combination of bed rest and chemotherapy these patients, especially those with cavitation, can be brought more rapidly to a stage at which they can safely undergo collapse or excisional therapy if this subsequently proves necessary. The regime should be similar to that for minimal disease, except that it must be remembered that short courses—that is, of forty-two days—have been followed by higher rates of relapse.

Tracheo-bronchial Disease.—If acute, tracheo-bronchial disease usually responds to this type of therapy in forty-two to sixty days.

Palliative Treatment.

Palliative treatment with streptomycin and PAS can be used in hopeless cases of pulmonary tuberculosis for the amelioration of cough, the lessening of sputum and the relief of any coexisting tracheo-bronchitis. Short courses of two to three weeks are usually sufficient for this purpose and can be repeated if necessary.

Prophylactic Treatment.

Prophylactic treatment should be given in all cases of excision for pulmonary tuberculosis, and when there exists a real danger of spread following any surgical procedure. Theoretically, if these drugs are used for purely prophylactic measures, a constant blood level should be maintained. Thus, a dose of 0·5 gramme of streptomycin twice daily *plus* 12 grammes of PAS daily should be given several days before surgical procedures, and for at least two weeks afterwards.

Conclusion.

Finally, I wish to stress the fact that the most lasting results in the fight against active pulmonary tuberculosis are obtained by earliest control. This can be achieved only by the combination of, and the readiness to utilize, every method of effective treatment in our power; by rest, by chemotherapy and by surgery.

I can think of no better words to support this plea than those of Publilius Syrus: "*Inopi beneficium bis dat, qui dat celeriter.*" ("He bestows twofold benefit to the needy, who bestows it quickly.")

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BARBITURATES IN SPINAL ANÆSTHESIA.

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IN 1945 one of us (Shaw, 1945) showed that phenobarbital and pentobarbital affected all nerve endings, whether motor, autonomic or sensory, and also reversibly abolished conduction in nerve fibres; that is, they had local anæsthetic properties. The suggestion was made that these substances might be used as spinal anæsthetics. Apart from paralysis of the phrenic roots, the most serious disadvantage of cocaine substitutes in spinal anæsthesia is their convulsive action on the central nervous system. This disadvantage would be obviated by the use of barbiturates; instead there would be a sedative action—something to be desired. Paralysis of the phrenic roots would be expected to the same degree in each case. Actually the results indicated that this action was less with the barbiturates than with procaine.

The greatest danger in their use was expected to arise from the fact that solutions of the sodium salts of barbiturates are extremely alkaline (pH 8·0 or more). Against this, however, it had been shown that the conduction of a nerve was unaffected by immersion in a solution of pH 10·0 for several hours. Accordingly animal experiments were undertaken to determine whether injection of such solutions into the subarachnoid space would result in damage to the cord.

Initial Experiments.

The initial experiments were carried out on dogs without surgical intervention. The dogs were premedicated with 60 milligrammes of morphine and were maintained under chloroform anæsthesia. The injection was made at the level of the fourth or fifth lumbar vertebra, a trochar and cannula being used, the dog lying on its side and being well flexed. The depth of the cannula was "felt" rather than precisely known, and on removal of the trochar the presence of cerebro-spinal fluid in the cannula was tested. When cerebro-spinal fluid was found in the cannula, the drug was slowly injected as about 1·5 to 2·0 millilitres of solution, a similar volume of cerebro-spinal fluid being first removed if the intrathecal pressure was at all pronounced.

After recovery from the general anæsthesia the dog was observed for ability to walk and for return of sensation in the hind legs.

Results are given in Table I.

The dogs salivated intensely for about two hours after the injection, but this could be easily controlled with atropine.

The results showed that even with the largest doses used (500 milligrammes per two millilitres), death from respiratory failure did not occur. Presumably the phrenic roots were not affected; however, certain dogs did not regain their normal gait even after a week. This could be due either to damage to fibres by the alkalinity of the solution or to mechanical damage of fibres during the insertion of the needle. It must be remembered that in dogs the cord extends the length of the spinal column. In dogs with disturbed gait a post-mortem examination of the cord sometimes revealed blood clots and evidence of mechanical damage due to manipulations with the needle, the insertion of which was extremely easy in some dogs, difficult or impossible in others.

TABLE I.

Drug.	Experiment Number.	Dose. (Milligrammes.)	Time for Onset. (Minutes.)	Time for Recovery. (Minutes.)	Notes.
"Pentothal."	1	200	About 5	45	Recovery.[1]
	2	250	5		No recovery.
	3	260	5		No recovery.
"Amytal."	1	200	5		No recovery.
	2	500	5		No recovery.
	3	100	10	40	Recovery.
	4	120	5	60	Recovery.
	5	120	5	60	Recovery.
	6	150	10	60	Recovery.
Pentobarbital.	1	200	5	60	Almost complete recovery.
	2	130	5	60	Recovery.
	3	200	5	—	No recovery.
	4	130	10	—	Partial recovery.
	5	200	5	—	No recovery.
	6	150	5	—	No recovery.
	7	200	5	—	No recovery.
	8	160	10	—	After 20 minutes comatose for 75 minutes.
	9	100	5	35 to 80	Coordination impaired.
	10	100	5	45	Recovery.
	11	100	5	—	Incomplete recovery.
	12	50	5	30 to 45	Recovery.
	13	50	5	25 to 35	Recovery. After one hour, upper leg recovered; lower leg paralysed. Next day recovered.
	14	80	5	—	After one hour, upper leg recovered; lower leg completely paralysed.
	15	80	5	60	Almost complete.
	16	80	5	47 to 75	Upper leg recovered; lower leg completely paralysed.
	17	70	Indefinite	Indefinite	Recovery.
	18	100	5	35	Recovery.
"Veronal."	1	400	5	60	Recovery.
	2	200	5	60	Recovery.
	3	300	5	60	Recovery.
	4	120	5	60	Recovery.
	5	200	5	210 to 240	Partial recovery.
	6	180	10	120	Recovery.
	7	133	5	30 to 35	Recovery.
	8	133	8	35 to 40	Recovery.
	9	133	10	35	Listless; walking well.
	10	133	8	25 to 35	Listless; walking well.
	11	180	5	25 to 30	Depressed; walking well.
	12	250		90	Listless; recovery.
	13	250	3 to 5	10 to 15	Recovery.
	14	250		10 to 20	Recovery.
Phenobarbital.	1	500	5		No recovery; cord damaged.
	2	500	5	60	Recovery; no cord damage.
	3	300	5		Partial recovery; slight cord damage.
	4	100	5	40	Recovery.
	5	200	5	60	Recovery.
	6	300	5	60	Recovery.
	7	200	5	60	Recovery.
	8	100	5	30	Recovery.
	9[2]	200	5	30	Recovery.
	10[2]	200	4	60	Fairly complete recovery; some weakness in lower leg.
	10[2]	200	Delayed	Delayed	Upper leg recovered; lower leg completely paralysed.

[1] "Recovery" means that at the end of the period stated the animal was able to walk normally and remained so able for a period of a week or longer (when the animals were usually used for some other purpose).

[2] The last three dogs, *post mortem,* showed no blood clots or cord damage.

Second Series of Experiments.

Since such damage and blood staining was almost certainly due to mechanical difficulty in giving the injection, it was decided to perform a laminectomy at the level of the fifth lumbar vertebra and to inject the drug below the exposed dura.

This was done, the dogs being first made drowsy with 60 milligrammes or more of morphine and being maintained under chloroform anæsthesia throughout the operation. The dog was tied out over a wooden wedge-shaped block which gave sufficient flexion to the back; the skin was shaved at the required part and a medial incision was carried down to the spine. Bone-nibbling and bone-cutting forceps were used to remove a small square of bone on the fourth or the fifth lumbar vertebra. Frequently there was much bleeding during this part of the operation, and pressure with swabs was used to control it at this stage (in later experiments an electric cautery was used). The edges of cut bone were smoothed out as much as possible and the injection was made slowly, subdurally; usually an equal volume of cerebro-spinal fluid was withdrawn before the injection was made. The cavity was then packed with cotton wool or Horsley's wax to reduce hæmorrhage to a minimum and the incision was closed. The animals recovered from the chloroform almost immediately and were observed for differences in their behaviour before and after the operation. If the animals recovered fully, they were killed five to seven days afterwards and the spinal cords were examined.

Fifteen dogs and one cat were used in such tests, phenobarbital being injected, and one dog only was tested with pentobarbital.

Results.

In the one experiment with pentobarbital, premedication consisted of 200 milligrammes of morphine. Chloroform anæsthesia was used, and ceased during suturing of the skin. Pentobarbital (150 milligrammes) was injected subdurally. Respiration failed twenty minutes after the injection and could not be restored. There were no apparent complications during the operation, and chloroform was lightly used. Death was apparently due to the pentobarbital.

The results of the use of phenobarbital in dogs are shown in Table II.

In the case of the cat, premedication with atropine was given and ether anæsthesia was used; 125 milligrammes of phenobarbital were injected in two millilitres of solution. Good recovery occurred. Hind-limb paralysis was present for about one hour. The cat was still well two months later.

Comment.

In the second series of 16 experiments there were six deaths from respiratory failure within twenty minutes of the injection, whereas in the first series there were no deaths in 52 experiments. Furthermore, the deaths seemed unrelated to the dosage of phenobarbital. In the first series two dogs survived a dose of 500 milligrammes; in the second, one dog died from as little as 100 milligrammes. We are at a loss to explain the deaths in the second series. Certainly the dogs had been receiving chloroform for a period of two hours. Had this increased the permeability of the phrenic roots to phenobarbital? Had there been a synergism between the toxic action of chloroform and phenobarbital on the central nervous system? That animals subjected to laminectomy under prolonged chloroform anæsthesia were more susceptible to spinal anæsthetic agents was shown by the fact that one millilitre of 1% procaine solution killed five out of five dogs, whereas Bieter *et alii* (1936) have shown that 4% procaine solution injected intraspinally did not produce death in six rabbits. Microscopic examination of the cord of the recovered dogs showed no damage. We feel certain that these results show that barbiturates do not damage the cord.

The fact that so many dogs did die in the second (laminectomy) series of experiments was a disappointment, and although we felt that it was due to anæsthetic or operational complications, we were sufficiently discouraged not to push for a clinical trial.

However, during a recent visit to the United States, one of us (F.H.S.) mentioned our experiments to Professor Koppanyi, of the Georgetown University, Washington, D.C. He was particularly interested in the problem and proceeded to carry out experiments on rabbits, using the technique of Bieter *et alii* (1936). The results confirmed those of our first series (without operation). So encouraged, he arranged for a clinical trial. The results have just been reported (Morrison, Koppanyi and Tuohy, 1950).

TABLE II.

Morphine. (Milligrammes.)	Phenobarbital. (Milligrammes in Millilitres.)	Notes.
60	36 in 1	Good recovery; hind legs paralysed for some hours. Free movement next day. Killed fifth day; no abnormality detected in cord macroscopically.
60	100 in 2	Much bleeding. Good recovery; hind limbs paralysed for 1½ hours. Fifth day killed; hæmatoma over site. No abnormality detected in cord, macroscopically.
60	100 in 2	Died without regaining consciousness.
60	125 in 2	Ready recovery; whined and moaned; more morphine given. Hind-limb paralysis for about two hours. Killed fifth day. No abnormality detected in cord macroscopically or microscopically.
150	300 in 3	Unconscious for more than eight hours'; next day fully recovered except for stiffness in hind legs; second day, fully recovered. Killed seventh day; no abnormality detected in cord macroscopically.
75	300 in 3	Much hæmorrhage. Next day, much distressed and showing marked paralysis. Killed, no autopsy performed.
100	450 in 4·5	Chloroform ceased at injection. Respiration ceased three to four minutes later, and could not be restored. Death apparently due to phenobarbital. There was no hæmorrhage.
200	400 in 4	Light anæsthesia throughout. Death from respiratory failure 25 minutes after injection. No hæmorrhage during operation. Death apparently due to phenobarbital.
100	180 in 3	No hæmorrhage. Respiration ceased 20 minutes after end of injection. Death apparently due to phenobarbital.
150	150 in 2·5	Good recovery. Third day, unable to walk or stand on hind legs. Killed and cord removed. Autopsy showed pulpy and necrotic muscles. No abnormality detected in cord macroscopically.
150	150 in 2·5	Recovery good. Third day showed swelling at site. Killed; autopsy showed large amount of pus; muscles reasonably intact; dura inflamed and ruptured at site of injection.
150	125 in 1·25	Good recovery. Killed third day; no abnormality detected in cord macroscopically.
125	150 in 1·5	Respiration ceased some 20 minutes after injection. No chloroform had been given for the greater part of the operation. Death apparently due to phenobarbital.
200	125 in 1·25	This dog was a greyhound, requiring much chloroform. Recovery was good, but dog died on the third day after injection, after passing much blood in the fæces, apparently as a result of liver damage due to the chloroform. No abnormality detected in cord macroscopically.
150	150 in 1·5	Good recovery. Killed third day. No abnormality detected in cord macroscopically.

The continuous spinal technique of Tuohy (1945) was used in each case. Of the several barbiturates examined, thiopental sodium ("Pentothal") and pentobarbital sodium ("Nembutal") appeared to be the most promising. A 5% solution of sodium phenobarbital produced either minor or questionable sensory changes.

Thiopental sodium was prepared in a 5% solution by dissolving 500 milligrammes of the sterile powder in eight millilitres of either 5% dextrose solution in water or Ringer lactate solution. In addition, two millilitres of 10% dextrose solution were added to bring the volume to 10 millilitres and insure a hyperbaric anæsthetic solution. The initial dose varied from three to four millilitres and fractional doses were continued according to the individual needs of the patient. The maximum dosage was 850 milligrammes administered over a period of 150 minutes. The average dose was 400 milligrammes.

"Nembutal" (from 5% to 6·2% solution) was used in nineteen cases, with equal or better results. The onset of sensory anæsthesia requires from three to seven minutes and, once it is established, it lasts from twenty to forty minutes. Motor effects, when they occur, appear from five to twelve minutes after the introduction of the anæsthetic agent. Two post-anæsthetic complications were observed; both consisted of hypæsthesia of the right leg. One of these patients had had a similar experience following subarachnoid anæsthesia two years earlier (agent unknown). One of the striking effects of the subarachnoid use of thiopental and "Nembutal" was cerebral depression of varying intensity. This was observed in all but a few patients.

The operations carried out included hernioplasty, amputation and gastrectomy.

Summary.

The results of the use of barbiturates as spinal anæsthetic agents in dogs are described.

"Sodium Pentothal" and pentobarbital have been used clinically for this purpose.

Acknowledgement.

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SWELLING ON EITHER SIDE OF THE WRIST.

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MOST medical practitioners are familiar with the condition known as de Quervain's disease, in which there is a localized thickening of the combined tendon sheaths of the *abductor pollicis longus* and the *extensor pollicis brevis* over the lateral side of the radial styloid process. There is a condition, not often recognized, in which the tendon sheath of the *extensor carpi ulnaris* is thickened and gives rise to a diffuse swelling in the region of the head of the ulna, creating the impression that the latter is itself enlarged. Because these two conditions are so frequently undiagnosed and are the cause of disability, it is believed that their existence should be brought to the attention of medical men once more, especially as they are readily amenable to treatment in the nature of simple surgical procedures.

DE QUERVAIN'S SYNDROME.

The condition of *tenovaginitis stenosans* of the *abductor pollicis longus* and *extensor pollicis brevis* tendon sheath was originally described by de Quervain in 1912 and is frequently encountered in medical practice and is mentioned in most text-books of surgery; this last-mentioned fact is apparent by the readiness with which the recent graduate is put at his ease when the lesion is given the title of de Quervain's disease after being shown to him and described as *tenovaginitis stenosans.*

Pathology.

Macroscopically, thickening of the dorsal carpal ligament and the underlying tendon sheath of the *abductor pollicis longus* and *extensor pollicis brevis* is apparent. In most cases the tendons of these two muscles pass diagonally downwards over the radial styloid process in a single compartment, but occasionally they lie in separate compartments, and in such cases it is necessary to make sure that both compartments are explored. It is as well to remember that there can be an aberrant *abductor pollicis longus* tendon, and when there is it would be easy to overlook the *extensor pollicis brevis* if two compartments were present. Microscopically, the changes present in numerous pieces of dorsal carpal ligaments and synovial sheaths submitted for examination have been those of non-specific inflammation in every case.

Ætiology.

No definite ætiological factor can be found, and the role of trauma cannot be established; but some injury before the onset of symptoms can be recalled in many cases, especially when the question of compensation arises.

History.

The most usual complaint is one of pain over the radial side of the wrist; this is aggravated by certain movements of the hand and thumb—those which put strain and stretch on the tendons of the *abductor pollicis longus* and the *extensor pollicis brevis.* Such movements are wide abduction of the thumb, adduction of the thumb and ulnar flexion of the wrist. At times the pain is referred downwards into the back of the thumb and index finger; in such instances it can be assumed that the superficial branches of the radial nerve which pass over the radial side of the wrist are involved in some changes in the tissues superficial to the dorsal carpal ligament. In other cases the pain will radiate upwards towards the elbow and may be mistaken for that of epicondylitis.

Physical Examination.

Physical examination reveals either a visible or a palpable tumour resembling a segment of a cherry situated over the lateral side of the radial styloid process. It varies in size from an eighth to a third of a cherry. Its consistency is that of bone and it is immobile. Tenderness is always present and is a diagnostic feature when the swelling is small. If *tenovaginitis stenosans* is present there is always a tumour, and it can be felt as a smooth, hard, immobile structure in the expected location. Squeezing of the hand so that the thumb is forcibly adducted across the palm will cause a sharp pain on the radial side of the wrist in nearly every case. Wrist movements, especially ulnar and radial flexion, are limited by pain at the same site. No bony changes are found on radiological examination.

Treatment.

Conservative measures are a waste of time. Complete and immediate relief can be given by means of a simple surgical procedure, but a few practical points need mentioning.

The Operation.

Through a transverse skin incision over the lateral aspect of the wrist, after the limb has been rendered ischæmic by a pneumatic tourniquet, the superficial branches of the radial nerve are identified and retracted. The tendon sheath is opened distal to the transverse carpal ligament and a probe is passed proximally; the constriction is readily felt and may be further up the sheath than is anticipated. The sheath and dorsal carpal ligament are incised over the probe in the line of the tendons to a point well above the constriction. The effect of the latter is apparent in the tendons, and now they should move freely on passive movements of the thumb. The skin only is sutured and care must be taken not to injure the superficial branches of the radial nerve during the process. No special after-treatment is necessary, but early thumb and wrist movements are encouraged.

The points to remember are the proximity of the superficial branches of the radial nerve, the fact that the tendons may lie in separate compartments, and the fact that an aberrant *abductor pollicis longus* tendon may be present.

CHRONIC TENOSYNOVITIS OF THE EXTENSOR CARPI ULNARIS TENDON SHEATH.

Although not seen so often as de Quervain's disease, tenosynovitis of the *extensor carpi ulnaris* tendon sheath is more common than is realized. It was first described by Dickson and Luckey in 1948, and, as they pointed out, it produces a fairly consistent clinical picture. In the past it has probably been diagnosed as a chronic strain of the wrist and is possibly the cause of residual pain after Colles's fracture, when there appears to be some displacement and enlargement of the head of the ulna. Whenever swelling is present over the ulnar side of the wrist with apparent enlargement of the lower end of the ulna, tenosynovitis of the *extensor carpi ulnaris* must be ruled out as the cause.

Pathology.

Macroscopically the changes are confined to the tendon sheath of the *extensor carpi ulnaris*; there is no thickening of the dorsal carpal ligament, but the surrounding subcutaneous tissue is œdematous. There is thickening of the synovial tissue of the sheath, and in some cases the appearance is that of granulation tissue with œdematous dark pink bands joining the sheath to the surface of the tendon. The surrounding sheath does not share in these changes to any greater extent than being thicker than normal. Blood-stained fluid is present in the sheath at times. Microscopically the changes are those of non-specific inflammation.

Ætiology.

Trauma sems to be a factor in this condition, and the symptoms follow some twisting injury of the wrist or a direct blow in the region of the head of the ulna.

History.

After the injury the patient complains of pain in the wrist itself. Later the pain may become localized to the ulnar side of the joint, and at times it radiates to the ring and little fingers. Often the pain remains seated deep in the wrist joint and is increased by all joint movements, but especially by radial flexion and ulnar flexion against resistance. Pain in the ring and little fingers may be replaced by tingling and numbness; this is caused by involvement of the dorsal cutaneous branch of the ulnar nerve.

Physical Examination.

In the early stages the only positive physical findings are tenderness along the line of the lower part of the tendon of the *extensor carpi ulnaris* and pain caused by radial flexion and ulnar flexion of the hand against resistance. Swelling appears after the onset of the pain; it may be confined to the region of the head of the ulna, in which case this appears enlarged, or it may extend further up and down the sheath. In any case the typical swelling is an apparent enlargement of the head of the ulna, and this is due mainly to the subcutaneous œdema. As in de Quervain's disease, so in this condition there are no abnormal radiological changes.

The diagnosis is made on the complaint of pain deep in the wrist joint along with swelling on its ulnar side and tenderness over the tendon of the *extensor carpi ulnaris*.

Treatment.

Conservative measures seem doomed to failure in this condition also, and a similar type of operation to that used for *tenovaginitis stenosans* of the *abductor pollicis longus* and the *extensor pollicis brevis* will certainly give relief.

The Operation.

After the establishment of a bloodless field by means of a pneumatic tourniquet, the surgeon makes a skin incision along the line of the *extensor carpi ulnaris* tendon in its distal two and a half inches; at its lower end the incision turns laterally for about an inch. The dorsal branch of the ulnar nerve is isolated and retracted volarwards. After the dorsal carpal ligament has been incised, the sheath of the *extensor carpi ulnaris* comes into view. The latter is opened widely, and the condition of the synovial tissue is dealt with according to the findings; thickened tissue is removed and adhesions between the sheath and the tendon are divided until the latter is quite free. Then the dorsal carpal ligament is repaired and the skin is closed with the necessary precautions to avoid damage to the branch of the ulnar nerve. No special after-treatment is necessary.

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Reports of Cases.

SUDDEN DEATH IN LABOUR FROM AMNIOTIC FLUID EMBOLISM.

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IN recent years a number of sudden deaths in labour from amniotic fluid embolism has been reported in the literature, but the condition is not well known.

Case I.

A married woman, N.W., aged forty-three years, was first examined by her doctor on February 2, 1950. She was found to be well into the first stage of labour with what appeared to be a full-time fœtus, vertex presentation. The fœtal heart was heard. Labour had commenced about 2 a.m. that day, when the patient had had a "show". Normal contractions were occurring every five minutes. The patient did not think she was more than two months pregnant, if at all. She was admitted to hospital at 9.45 a.m., having contractions every five minutes. She seemed a little distressed by the pain. At 10 a.m. she was given 100 milligrammes of pethedine hydrochloride hypodermically, but was not much relieved by this. The bowels were opening freely, and the patient vomited small amounts of bile several times. Her bladder was catheterized; the urine was clear. At 11 a.m. the administration of pethedine was repeated. At about this time the patient complained of a burning pain in her breasts causing her distress. Her colour was good. There was no respiratory distress. Her pulse rate was 100 per minute and the pulse was of fair volume. At 11.30 a.m. the patient complained that she could not stand the pain in her chest any longer. Her face then became cyanosed. Oxygen was administered continuously under a mask. Two millilitres of "Coramine" were given into the heart. The pulse was practically absent, and cyanosis of the left arm, the face and the neck was increasing. However, the legs were white in colour and cold. The "Coramine" injection was repeated into the heart and intramuscularly. Five minims of adrenaline were given into the heart. She died at 11.45 a.m. Until the end there was no sign of any respiratory distress. She was breathing easily, but a little rapidly. The death was reported to the coroner and the body was conveyed to the morgue.

Post-Mortem Examination.

The following notes are relevant.

The face was livid. The heart was a little enlarged from dilatation of the left ventricle. The muscle of the left ventricle was thin. There were no scars in the heart wall. Severe coronary arterial disease was present affecting both main arteries and their branches. The lumina of both coronary vessels were considerably reduced. The left descending branch was thickened, calcified and sclerosed. Examination of microscopic sections of the

heart muscle revealed ischæmic fibrosis with hypertrophy of the cardiac fibres. Many muscle fibres were disappearing with fibrous tissue replacement. The lungs were engorged with dark fluid blood. There was a little frothy fluid in the air passages. The kidneys were diseased. They were a little shrunken in size. Their surfaces were granular, their capsules were adherent and their cortex was reduced. The surfaces were pitted and irregular. There was a slight degree of bilateral hydronephrosis with some infection. This was confirmed by microscopic examination. Pyelonephritis was present.

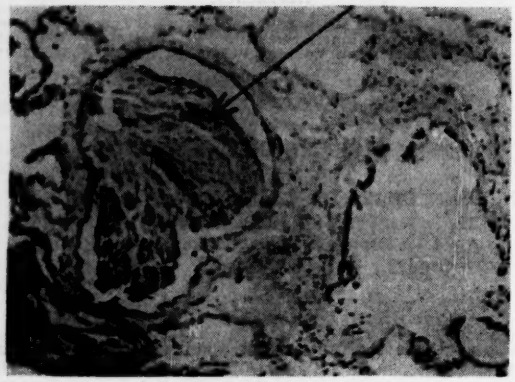

FIGURE I.

The uterus was enlarged to the size of a full-time pregnancy. The os was dilated and taken up. It admitted three fingers easily. There was a full-time normal male fœtus in the uterus with the vertex presenting. The placenta was present on the upper posterior wall of the uterus. It was separated along its lower margin for a distance of about one inch. The membranes were intact. There were no marks about the uterus.

The microscopic appearance in the lungs is illustrated in Figure I. Examination of practically all the microscopic blood vessels in the lung in two different blocks of tissue cut from either side of the lung in the lower lobes revealed, with hæmotoxylin and eosin staining, amorphous pale-bluish material mixed with the blood. Many of the capillaries were filled with this material. This foreign material showed the presence of nuclear epithelium-like cells in some vessels (well illustrated in the section), but not in others.

Case II.

A married woman, B.P., aged eighteen years, first attended the ante-natal department, Queen Victoria Hospital, on November 11, 1948, when three months pregnant. The expected date of delivery was May 19, 1949. General examination, including an X-ray examination of the chest and a Wassermann test, revealed no abnormalities. She attended the ante-natal clinic regularly at monthly intervals till the thirty-second week of pregnancy, and fortnightly from then on. Except for slight œdema of the hands during early May, her pregnancy was normal.

She was admitted to hospital at 7.45 p.m. on May 30, 1949, early in labour, pains having commenced at 6 a.m. that day. At 5 a.m. on the following day she was having good uterine contractions every two to three minutes; the vertex was presenting, the head being fixed, but still palpable above the brim of the pelvis. The *cervix uteri* was then between one-half and three-quarters dilated, and the sagittal suture of the fœtal skull was in the transverse diameter of the pelvis. Pethedine (100 milligrammes) was given at 5.15 a.m. At 9 a.m. the maternal pulse rate was 104 per minute and the fœtal heart rate 132 per minute, and contractions were occurring about every one or two minutes. At 9.20 a.m. the fœtal head could still be felt above the brim of the pelvis. On rectal examination the vertex was felt at the level of the iliac spines, and the cervix appeared to be fully dilated; the membranes were not felt. Pethedine (100 milligrammes) was given at 9.30 a.m. At 10 a.m. the maternal pulse rate was 100 per minute. At 10.15 a.m. the nurse heard stertorous breathing, and the patient was found to be very cyanosed. The pulse was then just palpable, and respirations soon ceased. Artificial respiration was attempted, and oxygen was administered, without improvement. At 10.25 a.m. a female infant was easily delivered with forceps. The baby's heart was then beating feebly, but respiration was not established. The infant's weight was eight pounds ten and a half ounces, and the length was 21·5 inches.

Post-Mortem Examination.

The posterior lip of the uterine cervix was bruised, but not lacerated, and the cervix was widely dilated. The placenta was in the fundus of the uterus and the edge had commenced to separate. The membranes were adherent to the remainder of the uterus. The great veins were distended with fluid dark blood. There were about one and a half ounces of clear fluid in the pericardium. The left ventricle was relaxed, but did not appear to be dilated. Both lungs were free, but were extremely congested, though crepitant. The trachea and bronchi contained a little thick mucus. The kidneys were both congested, but appeared normal. Examination of the hæmatoxylin and eosin stained section of the lung showed a few œdematous alveoli, with emphysema of some adjacent alveoli. The lungs were congested, and bluish-staining debris, resembling epithelial cells of amniotic fluid, was present with blood in some of the larger blood vessels.

We consider that these two cases are examples of sudden death from amniotic fluid embolism.

Acknowledgement.

We are indebted to Dr. Gladys Whight, of Boronia, for details of the clinical history in Case I, and Dr. Roberta Donaldson for the history in Case II.

Reviews.

EXERCISES FOR THE ASTHMATIC CHILD.

A BOOKLET entitled "The Asthmatic Child" by Dr. G. F. Walker[1] sets out to deal with the prevention of juvenile asthma by simple home methods. There are two pages of text, setting out some homely good advice in summary form and very general terms. The remainder of the booklet is devoted to photographs illustrating ten simple physical exercises intended to indicate methods of "developing and strengthening the flexibility" of the muscles of the chest wall, and of helping to get "the shoulders in proper alinement and the child's gait and posture in good order". There are no directions as to when the exercises should be carried out, but the exercises themselves should be helpful in that most of them cultivate the act of full expiration and contract the anterior abdominal wall.

ASTHMA.

IN a short book on asthma Dr. Clement Francis deals mainly with practical points.[2] His chief object of treatment is to control the vasomotor instability which is the fundamental cause of an attack, and this he does by perpetuating the technique of nasal cauterization which his father employed. However, he emphasizes that this is "in addition to the usual remedial measures". Skin testing and desensitization have their merits, but also their limitations. Nose and throat operations have lost their former popularity in asthma in favour of what Francis considers an

[1] "The Asthmatic Child: The Prevention of Asthma by Simple Home Methods", by G. F. Walker, M.D., F.R.F.P.S.G., D.C.H., M.R.C.P.; 1950. Bristol: John Wright and Sons, Limited. London: Simpkin Marshall, Limited. 8½" × 5½", pp. 19, with many illustrations. Price: 2s. 6d.

[2] "Asthma", by Clement Francis, M.A., M.B., B.Ch. (Cambridge); 1950. London: William Heinemann (Medical Books), Limited. 7¼" × 5", pp. 42, with a few illustrations. Price: 5s.

excessively conservative policy. Besides the usual operations, performed according to the customary indications, he also advocates cauterization of the lateral pharyngeal bands, particularly when a paroxysmal cough is troublesome.

A warning against operating on patients who are sensitive to aspirin is continually repeated throughout the text. For medicinal remedies the author relies on adrenaline—he strongly deprecates its use in an inhaler—aminophylline when adrenaline fails, ephedrine sometimes, and potassium iodide for prevention. Antihistamine preparations have proved of very limited value. Breathing exercises are a useful adjunct.

This book breaks no new ground, but evaluates accepted methods of treatment, while favouring nose and throat methods.

NON-GONOCOCCAL URETHRITIS.

"NON-GONOCOCCAL URETHRITIS" by A. H. Harkness is a monograph that is well planned and well produced.[1] The illustrations accompanying the text are excellent.

One is intrigued by the number of conditions which may be responsible for urethritis. Most possibilities appear to have been considered, though it is probable that some of the manifestations mentioned will never be seen even by those with extensive venereal disease practices. Reiter's disease, which, though still uncommon here, is coming more under notice, is covered by two chapters with very full references at the end of each. The chapter dealing with the value of the complement-fixation test for gonorrhœa in differential diagnosis is provocative, but we concur with most of what the author writes. We still consider the test helpful in the differential diagnosis of infective arthritis, but agree that in positive reactions other supporting signs of gonococcal infection may generally be found.

Treatment of the various conditions of non-gonococcal urethritis is dealt with throughout the book as well as in a special chapter.

Brief but adequate reference is made to the criteria of cure and the importance is emphasized of serological tests for syphilis at the beginning and on completion of treatment.

An appendix contains a reprint of three memoranda on non-gonococcal urethritis issued by the Expert Committee on Venereal Diseases by the World Health Organization of the United Nations.

It has been apparent for some time, to those who deal with venereal diseases, that gonorrhœa is no longer a major problem. It is probable that in the near future text-books on urethral infections will, as Harkness suggests, give major space to non-gonococcal infections and restrict the consideration of gonorrhœa to a small chapter.

This book is for the specialist rather than for the general practitioner, who would refer to it but seldom. In its special field it is very welcome.

PLASTIC SURGERY.

BEFORE the last war Arthur Joseph Barsky's "Principles and Practice of Plastic Surgery" was regarded as the best primer and guide for the young surgeon embarking on this specialty. A greatly enlarged new edition of this well-known volume dedicated "to the Soldier Patients of World War II" has just come to hand.[2]

Whilst we recognize that the craft of plastic surgery cannot be learned from a text-book, Barsky's book does, at least, place in the hands of the apprentice in reparative surgery a most useful reference book in which can be found the various methods of reconstruction that can be employed in any particular problem case. The trained plastic surgeon will also derive much benefit from consulting this book and from studying the excellent diagrams and photographs which clearly show the author's technique in various procedures.

The first six chapters are devoted to the basic principles of free and composite skin grafting and to other tissue transplantation. The next nine chapters are devoted to the application of these principles to the restoration of tissue loss or displacement in the various parts of the body, virtually ranging from the top of the head to the soles of the feet. The last section of the book is devoted to the use and preparation of prostheses.

Both well-established methods and newer, less well tested procedures are included in the descriptions of the restoration of any particular defect, but the author is careful to indicate those techniques which have been most effective in his hands.

Altogether this is a carefully compiled book, brought thoroughly up to date, which will find a very welcome place in the library of those who are specializing in plastic surgery.

A TEXT-BOOK OF MEDICINE.

IN the fifth edition of his text-book[1] "The Practice of Medicine" Professor J. C. Meakins retains the arrangement of previous editions, the first of which appeared in 1936.

Of its 23 chapters, only five are contributed by other authors. Consequently the book has a uniformity of style and an individuality of approach which could not be produced by careful editing of other men's work. In truth, it is the system and concept of medicine as practised by the author. A student or practitioner following the ideas of such a distinguished physician would find himself well equipped for his work. This unity of authorship, however, imposes a great strain when the text-book is due for revision. In the six years that have elapsed since the last edition spectacular advances in all fields of medical knowledge have occurred, particularly in the field of treatment. In so far as the advances in treatment are those of antibiotics and chemotherapeutic agents, Meakins has met this problem by incorporating a new chapter on this subject. However, the changes in prognosis and management consequent upon these newer methods of treatment require to be written into the account of each disease so affected, and it is doubtful whether the reference of the reader to the chapter on treatment will meet his requirements. This degree of revision has been made in such diseases as subacute bacterial endocarditis, but not in the section dealing with the various forms of meningitis.

In arrangement, presenting symptoms and signs dominate the author in the grouping of disease—hence scarlet fever is included among the specific infections of the nasopharynx and mouth, the dysenteries and intestinal infestations among diseases of the gastro-intestinal tract. It is possibly somewhat inconsistent to include coronary artery disease among diseases of the visceral vessels, when the symptomatology is predominantly cardiac.

The physiological factors in respiratory, cardiac and hepatic diseases are well presented. The illustrations throughout are of excellent standard and add much to the value of the book. In particular, the coloured plates in the section on blood diseases are extremely good.

The section on diseases of the nervous system, the work of the late J. N. Pedersen, is well written. An exposition of anatomical and physiological principles precedes a section on pathology. The main radiographic techniques are illustrated by suitable skiagrams. The nervous diseases covered are unusually numerous for a work of this type, although little more than a synopsis of the main features of each is given.

The new chapter on psychosomatic medicine by Frederick R. Hanson replaces the brief section on psychiatry in previous editions. Meakins realizes that the term "psychosomatic medicine" is an unsatisfactory one, but shows good judgement in stressing the importance of psychic factors in the field of internal medicine. After an introductory section the various psychological and psycho-physiological mechanisms are discussed, and the principles of psychotherapy explained. Under appropriate headings various manifestations of a psychosomatic nature in respiratory, cardio-vascular, gastro-intestinal, endocrine and locomotor systems are described. While much of this material is

[1] "Non-Gonococcal Urethritis: Including the Genital Manifestations of Local and Systemic Diseases and Infestations of the Urinary Tract with Protozoa, Metazoa and Fungi", by A. H. Harkness, M.R.C.S., L.R.C.P.; 1950. Edinburgh: E. and S. Livingstone, Limited. 9¾" × 7", pp. 434, with 167 illustrations, some of them coloured. Price: 52s. 6d.

[2] "Principles and Practice of Plastic Surgery", by Arthur Joseph Barsky, M.D., D.D.S.; 1950. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 10" × 7", pp. 512, with 1029 illustrations, some of them coloured. Price: £5 7s. 6d.

[1] "The Practice of Medicine", by Jonathan Campbell Meakins, C.B.E., M.D., LL.D., D.Sc.; Fifth Edition; 1950. St. Louis: The C. V. Mosby Company. Melbourne: W. Ramsay (Surgical) Proprietary, Limited. 10" × 6¾", pp. 1578, with 518 illustrations, including 50 in colour. Price: £7 1s. 9d.

controversial, it is presented in a manner which is likely to give great help to general practitioners and their patients.

The other new chapter—chemotherapy and antibiotics—is a well-balanced exposition of the practical use of sulphonamides, penicillin and streptomycin. Brief mention is made of aureomycin and "Chloromycetin". The experience of a wise physician is shown in the last phase of the chapter—"but it is to be hoped that the use of all [antibiotics] will be properly evaluated before our enthusiasm runs away with knowledge".

The general impression after reading this book is that it is a well-written and well-produced text-book eminently suitable for both students and practitioners.

CLINICAL EXAMINATION OF PATIENTS.

EVERY medical student has a different approach to his subject, and no one text-book can hope to satisfy everyone. "Clinical Examination of Patients" by John Forbes and W. N. Mann is no exception.[1]

As the preface states, "the book is intended as a guide to the student during his introduction to clinical medicine". The authors attempt to cover the whole field, from the taking of the history to the use of ancillary diagnostic aids.

Firstly there is a chapter on "history-taking". Then follow a number of chapters dealing with the various individual "systems" in turn. Each of these includes a main section on physical signs, followed by a short section on radiology. These chapters are of varying quality, the one on the central nervous system being excellent, and the one on the cardio-vascular system not nearly so good. Surprisingly, the subject of vaginal examination is dismissed in a brief ten lines. The final section is a useful chapter on laboratory investigations, which includes the majority of common laboratory tests.

The whole is well set out, with a useful summary at the end of each chapter, and a comprehensive index. Illustrations are relatively few and far between for such a book, and it would be greatly enhanced by their judicious addition.

Any student, beginning his clinical work, would discover much of value in this book to guide him in his studies, even though, later, he may find he does not completely agree with all it contains.

MEDICAL PHYSICS.

IN 1944 an ambitious and heavy volume was published in the United States with the title "Medical Physics".[2] In the following year it was already evident that a new edition was necessary; there were omissions to fill up, inadequate treatment to rectify and further the advances in the application of physics to medical science were already displaying rapid growth. As material collected the publishers soon realized that a new edition would be unwieldy in size and very costly to produce, and so it was decided that a second volume should appear chiefly concerned with those subjects not dealt with in the original edition and bringing up to date a limited number of articles where such revision seemed urgently necessary. Thus Volume II of "Medical Physics" must be taken with Volume I as constituting a single whole treatise. It may be stated at once that the standard of this complementary volume is much superior to that of Volume I. In our review of the original volume we drew attention to certain blemishes such as unnecessary inclusion of non-physical matter, serious omissions and equally serious inadequate treatment of a number of topics. These errors have almost entirely been removed in the second volume. It is true that the Coriolis force and the design and use of the interferometer are still missing and the presentation of the properties of colloids is skimpy, but these, after all, are small matters in such a huge work. The 100% Americanism in the selection of authors is still visible, and the choice of home-grown experts in subjects which have been best pursued abroad is obvious, but the deliberate neglect of British contributions is happily absent. This two-volume work may be described as absolutely necessary for the libraries of medical schools, medical research institutes and medical societies. Rapid reference is helped by the alphabetical sequence of the topics and by a good subject and name index. Quite a number of the articles will be found so inclusive and up to date that they will displace separate text-books on the matters concerned; some indeed deal with recent extensions of physics to medicine on which nothing as yet has been published. No doubt a third volume will be issued as new discoveries accumulate and will earn the same welcome as this one.

[1] "Clinical Examination of Patients with Notes on Laboratory Diagnosis", by J. Forbes, M.D., M.R.C.P., and W. N. Mann, M.D., F.R.C.P.; 1950. London: Edward Arnold and Company. 8¼" × 5½", pp. 343, with 60 illustrations. Price: 18s. net.

[2] "Medical Physics"; Editor-in-Chief, Otto Glasser, Ph.D., F.A.C.R.; Editorial Assistant, Jessie C. Tucker; Volume II; 1950. Chicago: The Year Book Publishers, Incorporated. 10¼" × 7¼", pp. 1254, with many illustrations. Price: $25.00.

X-RAY DIAGNOSIS.

VOLUME IV of a second edition of a "Text-Book of X-Ray Diagnosis" by various British authors and edited by Cochrane Shanks and Peter Kerley has been received.[1] The first edition was published in three volumes in 1939; the present edition has been increased to four volumes.

Volume IV deals with the X-ray diagnosis of the bones and joints with short chapters on changes in the soft tissues and on the localization of foreign bodies.

The book is well arranged and profusely illustrated. In its early part the normal appearances are considered; there follows a full discussion on the general pathological appearances in bone disease and in congenital deformities. The authors stress the importance of set standards and multiple views in all investigations and insist that the radiograms must be of the highest quality.

The various regions of the body are dealt with in turn and a very useful list of the times of ossification of the bones is given when considering the part. Another helpful feature is the description of the various accessory ossicles met with in the hand and foot. The general pathology of bone is considered in detail, both in regard to gross and pathological aspects. The author (S. L. Baker) points out that bone formation takes place in two stages, (*a*) formation of organic matrix by the action of osteoblasts, and (*b*) conversion of matrix into true bone by the deposition of calcium salts. Bone removal takes place in one stage by multinucleate cells (deossification). There is no evidence that halisteresis (or osteolysis) occurs.

A good description is given of mechanical factors effecting changes in bones, and inflammatory conditions are adequately covered. Tumours affect bone by producing absorption and by production of new bone. Congenital deformities are considered by C. G. Teal and much interesting matter is introduced.

Part IV deals with traumatic lesions and is profusely illustrated.

Tuberculosis and syphilis of bones are considered exhaustively along conventional lines.

Hydatid disease, yaws, leprosy, Malta fever and actinomycosis all cause various bone changes.

The authors follow the British Medical Association classification in dealing with acute and chronic arthritis. This classification covers all forms in an orderly manner. Chronic spondylitis is divided into four classes: (*a*) rheumatoid, (*b*) chronic infective, (*c*) spondylarthrosis (*spondylitis arthritica*) and (*d*) *spondylitis ankylopoietica*. In the first two types the changes are as in other joints. In spondylarthrosis the changes are similar and sometimes spur formation is very gross. In the ankylopoietica types there are two divisions to be made, namely, a ligamentous and a muscular one. This is a very satisfactory classification. The first type shows mainly ligamentous ossification with formation of the "bamboo" spine, while the latter is mainly a disk atrophy and ossification limited to the anterior vertebral margins.

Osteochondritis and osseous changes after paralytic lesions are well described and illustrated. A special important chapter has been introduced dealing with intervertebral disk lesions. Constitutional diseases are dealt with in detail and such conditions as achondroplasia and chondrodystrophy described; other rare bones diseases are also considered.

The sections on malignant tumours of bone and changes occurring in the soft tissues show no new work.

The book is a most useful one and should find a place in the library of every radiologist.

[1] "A Text-Book of X-Ray Diagnosis by British Authors", in four volumes, edited by S. Cochrane Shanks, M.D., F.R.C.P., F.F.R., and Peter Kerley, M.D., F.R.C.P., F.F.R., D.M.R.E.; Second Edition, Volume IV; 1950. London: H. K. Lewis and Company, Limited. 9¾" × 6¾", pp. 608, with 553 illustrations. Price: 60s. net.

The Medical Journal of Australia

SATURDAY, DECEMBER 23, 1950.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: surname of author, initials of author, year, full title of article, name of journal without abbreviation, volume, number of first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

THE PATIENT AND HIS "SOCIOLOGY".

Most medical practitioners when asked to discuss treatment will at once think in terms of diseases—infections, deficiency disorders, new growths and so on. This is natural enough. They learn during their student days about specific diseases and how they arise, what happens when the human body is affected by a malady and how repair is effected. When they go into practice they are faced by a sick man who has certain complaints, certain symptoms and signs which in the patient's eyes are what prevent him from leading his normal day-to-day existence. The medical attendant must find out what is the matter with the patient; in other words he must find a label which the patient can use to impress his friends. He knows that in order to obtain the best results he must treat the patient's mind as well as his body—that he must view the man whole—but so much appears to be against him. Books are published on treatment, what to do for certain diseases and to relieve certain symptoms, what drugs to order for a specific purpose and what prescriptions to give as empirical remedies. Special articles on treatment are written in medical journals "for the practitioner" under the headings of different diseases; a series of this kind was published a few years ago in THE MEDICAL JOURNAL OF AUSTRALIA. And even that wholly admirable volume "The Medical Annual" has as one of its sub-titles "A Year Book of Treatment". From time to time descriptive tags are applied to medicine to indicate special aspects of its content or scope. Among these is sociological medicine which has to do with the whole environment of man; it has to do with his conditions or place of work and with his domicile and with the hazards to which he is exposed in any of his activities. The subject of sociological medicine is often considered in a detached philosophical fashion as something desirable and to be advocated for the attention of someone other than the person who is doing the considering. If the practitioner attending a sick person really wishes to encompass the whole man in his investigation, he will not forget what we may call the sociological approach.

This subject is one of those which should be brought to the notice of medical practitioners from time to time; in other words it is easily forgotten in spite of its recognized importance. The opportunity to bring the subject forward has arisen by the publication of a valuable book entitled: "The Sociology of the Patient".[1] That this volume is really intended for members of the nursing profession is a salutary reminder to everyone concerned that the environment of the patient, the building up of his morale and his acquisition of an equable and contented mind are not matters of momentary instruction but of continued effort. The author, Earl Lomon Koos, is Professor and Chairman of the Department of Sociology in the University of Rochester and also lectures to nurses in two hospitals. He introduces his subject skilfully by describing the patient as a person and discussing this fundamental fact in two opening chapters. He gives a short outline of the development of man since his first appearance on the earth and refers to evidence that man learned to make tools, to use them and to accumulate them as he developed physically. Man used the things about him in order to live. As he developed he learned to shape stone tools by hammering them one against the other, to shape wood by burning it and to do other things for his own welfare. He used fire for his own food, learned to use the skin of animals and to erect shelters. In other words, he began to manipulate his environment rather than to live in it as it demanded. In this way he developed ideas, ideals, skills, ways of speaking and writing, and these were his primitive culture. Koos defines culture as the pattern of man's ways of doing and thinking. The word pattern here is good because it denotes some kind of intentional design; we can thus recognize some forms of culture that are higher than others and forms that are peculiar to groups of human beings. Culture is not to be confused with society—a society comprises a group of people who share a common culture. If we speak of a more highly cultured person in a group, we mean that he has cultivated the ways of thinking and doing more intensely than others of his group have done. Koos points out that as man grows he undergoes two processes—he matures and he becomes a social being or socialized. As he goes through these processes man acquires attitudes towards the group of which he is a member and towards himself, goals for action pointed towards the future, and roles or patterns of behaviour that cause him to act in specific ways in his different group memberships. The sum of these acquired characteristics, together with his original equipment, constitute, Koos holds, man's personality. Man has his personality, but his social life is lived with others—it has been well said that society is a union of men, but not the men themselves. Thus we can understand Koos's conception of man's social life as a series of concentric areas, with himself, the individual, as the centre. These groups are many and of different sizes; they begin with the family and include organizations such as associations and unions for work or play, religious and communal bodies and even the race itself. In these groups the individual's personality lives and moves and has its being and develops itself, drawing something from the different groups. The more intimately the individual is bound up with his group, the more profound will be its influence upon him. These considerations show, if indeed such evidence is necessary, that illness is an involved affair. Several factors have to be reckoned

[1] "The Sociology of the Patient: A Textbook for Nurses", by Earl Lomon Koos, Ph.D.; 1950. New York, Toronto and London: McGraw-Hill Book Company, Incorporated. 8" × 5½", pp. 280, with a few illustrations. Price: $3.00.

with; there is the causative agent—infection, deficiency, tumour or what not—and there is the personality of the patient tempered by his social *milieu*. Koos states that only as a nurse realizes the interrelationship of the complex factors of an illness, can she expect to take her place as a professional nurse. Something of the same kind might be said of the medical attendant and the comprehensiveness of his treatment. In some respects the nurse has an advantage over the doctor in the handling of a patient. She has to do with him for lengthy periods when he will be, as it were, off his guard. When the doctor is about, the patient expects to be treated; with a nurse it is different. She probably sees changes and moods which the medical attendant does not see; she will be able to judge whether the patient has full confidence in the doctor's treatment and is prepared to help himself; she will be able by her talk with him to learn whether he is out of tune with his environment, whether anything apart from his disturbed physical condition is holding him back. We may therefore agree with Koos that the nurse is an educator, and she may, as he suggests, be a leader in an important social group. One of the instances of a nurse's opportunities quoted by him—and he has many—is an account of the way in which one nurse relieving the head sister in a hospital ward has a stimulating, cheerful and unifying effect on the patients in sharp contradistinction to the atmosphere produced by the regular sister.

Among the special problems which may concern a sick patient, those mentioned by Koos include the earning of a living, physical health, mental health, social environment and health, social security and leisure. Each of these might be the subject of a special essay, but enough has been written here about Professor Koos's book to reawaken interest in this important subject.

Current Comment.

RHEUMATIC FEVER IN DENMARK.

INVESTIGATORS into the incidence of rheumatic fever find it difficult to obtain reliable figures in most countries as the disease is not notifiable. Figures based on hospital admissions are difficult to interpret in relation to the community as a whole, and recourse is mostly had to considering the number of deaths attributed to rheumatic fever, a not very satisfactory index to the general incidence. In Denmark, Norway and Iceland the way of the investigator is easier, as rheumatic fever is notifiable, and Svend Clemmesen[1] is able to present figures obtained from weekly lists since 1878; the disease has indeed been notifiable in Copenhagen since 1854 and in other parts of the country since 1861, but only the figures since 1878 are considered reliable. The main possible diagnostic fallacies relate to the arthritis of gonorrhœa and gout, but these are considered unlikely to influence the statistics, especially for young people. The incidence of rheumatic fever in Denmark appears to have undergone a notable decline over the period of nearly seventy years considered, especially in Copenhagen, where, for example, a figure of 30 per 10,000 in 1900 has dropped to 4·8 per 10,000 in 1946. The general incidence is now so low that the question of drug prophylaxis, so much discussed in other countries, is not regarded as important. Clemmesen considers, on the basis of earlier investigations, that the decline is probably due to improvements in milk hygiene (with prevention of milk-borne epidemics of streptococcal sore throat) and in living and housing conditions. However, two interesting findings emerge from a comparison of the curves for the incidence of rheumatic fever and of sore throat (which is also notifiable). The single peaks of the two respective curves correspond and are thought to be most likely related to epidemics of sore throat of a special character and a special ætiology (that is, hæmolytic streptococcal infection). On the other hand the decline in the curve for the average incidence of rheumatic fever contrasts with the rising tendency of the curve for the average incidence of sore throat; Clemmesen suggests that nowadays most cases of sore throat must be due to other bacteria or to types that do not cause rheumatic fever, or else that predisposing and precipitating factors of some other kind must play a role in the production of rheumatic fever. Research into the bacteriological causes of sore throat in Denmark remains to be done. It is interesting to note in passing that investigators in other places have recorded a steady decline in the incidence of deaths from rheumatic fever. J. A. Glover[1] has found a considerable drop, with temporary fluctuations, in the English figures for deaths from rheumatic fever in the period from 1913 to 1943. He suggests that economic, dietary and environmental changes are concerned and also that a change may have occurred in the relationship between man and *Streptococcus pyogenes*. A similar decline in the death rate in South Australia was recorded by C. B. Sangster in 1940,[2] but it is not apparent in the figures for Sydney hospitals (1936-1946) quoted by Joan Storey[3] in 1948. It is a pity that figures for the general incidence of rheumatic fever are not available in more countries, including our own; it would be of considerable interest to know if any compare favourably with the creditable Danish figures.

[1] *Acta medica Scandinavica*, Supplementum CCXXXIV, 1949.

THE RISK OF MONGOLISM.

ADVICE is sometimes sought, and sometimes also needs to be volunteered, on the risk of mongolism incurred by an older woman or one who has already borne a mongoloid child. The problem is difficult, but important, and not much practically helpful information has been available. Some points brought out by J. A. Böök and S. C. Reed[4] may be found useful. The frequency of mongolism among newborn infants is difficult to determine; figures for its incidence in the community quoted by various investigators differ widely for different populations and also, not surprisingly, for different age groups. Böök and Reed mention various figures, including Böök's finding of a frequency of 1:1000 in the total population of a relatively isolated North Swedish group. They discuss the figures in the light of the high mortality rate amongst mongoloid children early in life, and conclude that for practical purposes the true value lies somewhere between 1:500 and 1:1500 newborn, and probably closer to 1:500. The first practical problem to be considered is the risk among siblings of mongoloid children. From figures published by Penrose in 1934, Böök and Reed have worked out that among a total number of 153 children born alive subsequent to the first mongoloid child, six were mongoloid. This gives an empirical risk figure of 3·9%. In terms more readily understood by the woman who seeks advice, the chance is 1:25, a risk 20 to 60 times greater than if no mongoloid child had been born into her family. Böök and Reed suggest that the situation should be explained carefully to the mother (it being borne in mind that most of them find it hard to understand what is meant by statistical chance) and the decision concerning future pregnancies left to her. Furthermore, the risk figures should not be used in such a way as to frighten the patient. Indeed, the explanation of the correct position

[1] *The Lancet*, July 10, 1943.
[2] THE MEDICAL JOURNAL OF AUSTRALIA, April 6, 1940.
[3] *Ibidem*, April 17, 1948.
[4] *The Journal of the American Medical Association*, June 24, 1950.

may reassure many who have believed the risk to be much greater. Unwarranted assurance of the patient that there is no risk could, of course, have embarrassing results for the medical adviser—in one case in 25. The second problem, the risk of the birth of a mongoloid child with the advancing age of the mother, is generally recognized as being real. Böök and Reed are critical of Benda's statement that 12·5% of all children born to women over the age of forty-four years will be mongoloid. They point out that this figure is based on a small amount of material and on the records of attendance at a clinic, which cannot be regarded as covering the total population of women over the age of forty-four years from which those bearing mongoloid children were drawn. They have worked out the age distribution of women bearing mongoloid children, from two series with a total of 1062 cases; with this and the total number of live births in the State of New York in a particular year (1946), they have determined the expected number of mongoloid children in each age group for the assumed frequencies of mongolism in the population at 1:500, 1:1000 and 1:1500 (the range previously accepted), and also the risk figure for each age group. The method is ingenious but quite practical. It reveals that if the frequency of mongolism is assumed to be 1:500, the statistical risk figure for women over forty-four years of age will be about 6%; it will be correspondingly less with lower frequency. The practical point is that any woman who becomes pregnant after the age of forty years runs a statistical chance of about 1% to 6% of having a mongoloid child. This does not provide the clear-cut advice that the individual patient wants—figures for the statistical chance never do or can—but it has a practical value, especially when placed alongside other factors relating to childbearing in later years.

KHELLIN AND A THERAPEUTIC ANTICLIMAX.

DURING the past few years a number of papers have appeared on the use of khellin in the treatment of the anginal syndrome. Khellin is obtained from the plant *Ammi visnaga*, known in Arabic as "Khella", which grows wild in the eastern Mediterranean countries and in Arabia. A decoction of the dried seeds of the plant is much used by the local population, according to G. V. Anrep, G. S. Barsoum, M. R. Kenawy and G. Misrahy,[1] and is frequently prescribed by local physicians as a diuretic and antispasmodic in cases of ureteral stones. Anrep and his colleagues tested khellin physiologically in dogs and found it to be an effective vasodilator with a selective action on the coronary vessels. They reported also a clinical trial and stated that continuous treatment with khellin gave favourable results in 35 out of 38 cases of *angina pectoris*. It appeared to act favourably on eight patients with coronary thrombosis, but no definite conclusions were reached. In 1949, Anrep, Kenawy and Barsoum reported further results.[2] They stated that of 250 patients with *angina pectoris* treated with khellin, 140 obtained distinct benefit, 85 moderate benefit and 25 no effect. In 50 cases of recent coronary thrombosis relief of associated anginal symptoms "seemed to have been accomplished". The drug was stated to produce a few side effects but was not toxic even after prolonged administration. Others have reported similarly on its therapeutic effects, sometimes with greater emphasis on undesirable side effects. Two recent papers may be mentioned. R. H. Rosenman *et alii*[3] administered khellin to patients with *angina pectoris*, chronic *cor pulmonale* and acute bronchial asthma under controlled conditions. Of 14 patients with *angina pectoris* given 100 to 200 milligrammes of the drug by mouth each day, a good response was obtained in 11, moderate improvement in one and no effect in two. Distinct improvement was obtained in all of eight cases of chronic *cor pulmonale*; in nine of 21 cases of acute bronchial asthma response to a single injection was prompt, often dramatic, but usually short-lived. Untoward reactions—nausea, constipation, lightheadedness, dizziness, diarrhœa, somnolence, insomnia, urticaria, dermatitis—were observed in 17 cases; their incidence increased with larger doses. Rosenman and his colleagues concluded from their study that khellin is a useful drug in *angina pectoris*, in chronic *cor pulmonale* and possibly in acute bronchial asthma. They found its side effects a limiting disadvantage. Charles A. Armbrust and Samuel A. Levine[1] likewise believe that khellin has a definite value in the treatment of *angina pectoris*, though its undesirable side effects present a problem; they suggest that it may meet the existing need for a long-acting coronary vasodilator. In their study of its administration to 53 ambulatory patients with *angina pectoris*, they gave by mouth a dosage of 40 milligrammes three times a day with control by means of placebos of identical appearance. They state that about 60% of patients showed improvement—used fewer nitroglycerin tablets, had fewer and milder attacks of pain and could walk greater distances. Uncomfortable side effects were a real deterrent to the use of the drug in many instances; about 60% of patients had nausea, anorexia and dizziness. In reaching these conclusions Armbrust and Levine were well aware of the difficulties in the evaluation of a drug for the treatment of *angina pectoris* and took considerable pains with their use of placebos to avoid fallacious conclusions. Nevertheless, they confirmed the favourable views of earlier investigators.

Now comes what appears to be an anticlimax. A group of 14 workers in New York, headed by Theodore Greiner, have studied the effects of khellin on a group of 39 patients, but have used a new method of evaluating the results.[2] The essence of the method is the use of a "daily report card", on which the patient records his condition at the end of each day with a mark under one of four headings: "same as usual", "bad day", "good day" and " no pain". The advantages of the method over other subjective and objective methods of evaluation are discussed at some length and appear to be valid. Particularly important is its provision of a large volume of data for analysis. In the study all patients at some stage received placebo tablets which consisted of lactose prepared in a form identical with the khellin tablets; neither patient nor medical examiner knew which was being taken at any particular time. Careful consideration of the data obtained brings out strongly the dangers inherent in taking too much notice of individual results or the findings over a short period in a test of this character. The over-all observation in the 39 patients, which involved the comparison of approximately 1500 days with each of the two agents, shows that khellin has no greater effect than lactose in the control of pain of the angina of effort. Greiner and his colleagues have dissected the data in a variety of ways, but in every case the statement just made is supported. It should not be inferred that no apparent effect was produced with khellin or that the "dramatic responses" reported by other investigators were missing; the point is that the "effect" produced and the "dramatic responses" were similar for both the drug and the placebo. The finding on toxic effects also is interesting. The experience in this series indicates that while oral daily doses of khellin of the order of 100 or 150 milligrammes occasionally give rise to pronounced side reactions, the vast majority tolerate such doses for several weeks with little or no unpleasant reaction. Comparison of khellin with the placebo shows that the majority of unpleasant symptoms occurring during the use of khellin had no relation to the drug. The whole report supplies an object lesson in the dangers of drawing conclusions from inadequate data. It is to be hoped that the method of investigation, which is simple and straightforward though not completely foolproof, will be taken up by others and applied to the assessment of other drugs. It may provide a check to the sweeping claims for new drugs that we have been all too familiar with in the past.

[1] *British Heart Journal*, Volume VIII, Number 4, 1946.
[2] *American Heart Journal*, April 1, 1949.
[3] *The Journal of the American Medical Association*, May 13, 1950.

[1] *The American Journal of the Medical Sciences*, August, 1950.
[2] *The American Journal of Medicine*, August, 1950.

Abstracts from Medical Literature.

BACTERIOLOGY AND IMMUNOLOGY.

Chloramphenicol in Typhoid Fever.

THEODORE E. WOODWARD, JOSEPH E. SMADEL AND HERBERT L. LEY, JUNIOR (*The Journal of Clinical Investigation*, January, 1950), have studied the effect of chloramphenicol and other antibiotics in the treatment of typhoid fever and typhoid carriers. All their patients yielded *Salmonella typhi* on blood cultures, and adequate laboratory control of therapy was available. Initial dosage was calculated on the basis of 50 milligrammes per kilogram of body weight; thereafter a daily amount of two to three grammes was given in divided doses, and where possible maintained for five days after the temperature had fallen. Usually this happened after 3·5 days of treatment with the drug. Of the 22 patients treated, four suffered a relapse, two had intestinal hæmorrhage, and one had perforation. Of the patients with relapse, all had shown a return of *Salmonella typhi* in the fæces after cessation of the drug, and they were all patients who, for reasons of short supply, had received less than the average course of therapy. The organisms recovered were tested for their sensitivity to the drug, and the original strains did not differ from those isolated in relapse. None of the patients became chronic carriers, though two persons in the carrier state could not be cured by large doses of the drug. Four patients were treated with polymyxin and five with aureomycin, but no benefit could be ascribed to either drug. The authors record no toxic effects of the drug, and point out that its action appears to be entirely bacteriostatic and that cure of the disease has a time relationship to the development of humoral immunity by the patient.

Immunological Groups of Poliomyelitis Viruses.

JOHN F. KESSELL AND CHARLES F. PAIT (*The American Journal of Hygiene*, January, 1950) have used three methods for the study of immunological groups of poliomyelitis viruses. Monkeys convalescent from poliomyelitis were challenged with a dose of the original infecting virus, sufficient to represent 100 doses of the previously estimated "PD50", that is, a dose to produce paralysis in half the animals tested. Other monkeys rendered immune by injection by various routes of an amount of infected cord of 1·0 gramme, were challenged with 100 "PD50" of the same virus, injected intracerebrally one week after the conclusion of the immunizing injections. Specimens of serum from the animals which survived in the previous experiment were collected, and were used for neutralization tests; the infecting "PD50" was mixed with double the volume of serum four hours before being inoculated intracerebrally into susceptible animals. These three experiments were calculated to disclose differences or similarities in the infecting viruses. Twelve strains of viruses were examined, and the results indicated that nine of them were identical; recovery from infection with or vaccination with any of them would protect from infection with any other of them, and the serum of an animal recovered from infection with one would neutralize the virus and prevent it from infecting a fresh animal. Two other strains were identical, and a single strain was different from each of the other two groups. Similar evidence of strains tested by other workers upholds the belief that there are at least 20 strains of Group 1 known, six strains of Group 2, and only the one of Group 3.

Synergism and Antagonism in Antibacterial Substances.

J. W. BIGGER (*The Lancet*, July 8, 1950) states that it has already been shown that two antibacterial substances may display either synergism with or antagonism to one another when acting on bacteria in a culture medium. He now reports a study of the antibacterial action of six substances—sulphathiazole, penicillin, streptomycin, chloramphenicol, boric acid and *p*-aminosalicylic acid—acting in pairs on *Bacterium coli* in a synthetic medium. Synergism was demonstrated in every combination except one. Antagonism was demonstrated in five combinations; in only three cases was it pronounced and permanent, and in only one of these (boric acid and sulphathiazole) was each substance antagonistic to the other. The author discusses possible explanations of synergism and antagonism and the practical importance of the examples discovered. He states that as regards synergism, it should be of value to know whether two antibacterial drugs may be given simultaneously. By the combination of two, it may be possible to obtain the required effect with a dosage of one that, if the drug was used alone, would be insufficient, whereas a higher dosage would have undesirable side-effects. More important is the probability that the use of two drugs instead of one will tend to prevent the multiplication of mutants resistant to one of the drugs. The author states that the antagonism demonstrated is unlikely ever to represent a real danger, but caution suggests the inadvisability of combining in any form boric acid with sulphonamides or with penicillin. The antagonism demonstrated of *p*-aminosalicylic acid to sulphathiazole is strong and permanent, but the low level of the maximum concentration of PAS obtainable in the human body removes the possibility of this antagonism occurring during treatment of a patient.

Primary Atypical Pneumonia.

WILLIAM S. JORDAN, JUNIOR (*The American Journal of Hygiene*, November, 1949), has studied the infectiousness and incubation period of primary atypical pneumonia. He states that during 1947-1948, 67 patients with the disease were admitted to hospital, criteria of diagnosis being X-ray findings, compatible clinical course, absence of bacterial causes, absence of response to penicillin and sulphonamides, and a fourfold increase in titre of cold hæmagglutinins. When it appeared that contact cases were occurring, the present inquiry was begun. In 29 instances similar histories were obtained from other members of the household, and were traced and diagnosed. These further cases of primary atypical pneumonia constituted 48% of the respiratory infections occurring in these households during the winter, and there was suggestive evidence that the occurrence of a minor upper respiratory illness often preceded the pneumonia. The range of the incubation period was five to nineteen days, the commonest being 12·7 days. The evidence suggested that primary atypical pneumonia was highly contagious within the epidemiological unit of the family.

Hyperimmune Antirabies Serum Concentrates.

H. KOPROWSKI, J. VAN DER SCHEER AND J. BLACK (*The American Journal of Medicine*, April, 1950) have prepared hyperimmune antirabies serum concentrates in rabbits and sheep. They state that one injection of antiserum exerted a definite protective effect in hamsters and in guinea-pigs which had been infected twenty-four hours previously with street virus. In contrast, a course of 14 injections of phenolized rabies vaccine instituted twenty-four hours after exposure failed in all instances to protect the exposed animals from rabies. A combined antiserum *plus* vaccine treatment of exposed hamsters seemed to have neither more nor less protective power than antiserum administered alone. The authors have calculated an effective protective dose of antiserum for guinea-pigs and hamsters, and suggest a tentative dose of five millilitres per kilogram of body weight for use in humans after moderate exposure (twenty-four hours after exposure). Several cases of antiserum treatment of humans exposed to rabies are described and discussed. The conclusion is reached that antiserum seems to have definite value and should be applied in every case of exposure to rabies, in conjunction with a short course of vaccine treatment.

Smallpox Vaccination.

A. S. BENENSON (*The Journal of the American Medical Association*, August 5, 1950) has studied the response of persons vaccinated simultaneously with live and heat-killed virus, to determine whether any morphological difference exists between the responses to potent and inert vaccine. He concludes that the "immune" reaction which develops in persons revaccinated with smallpox vaccine is an allergic reaction to vaccinal antigens and is not related to the infectivity of the vaccine applied. He considers that the use of the terms "immune reaction" and "reaction of immunity" should be discontinued, and that the term "immediate reaction" should be used to describe the vaccination effect which achieves its maximum within seventy-two hours. He states that heat-inactivated smallpox vaccine can produce in revaccinated persons reactions that are morphologically indistinguishable from the so-called "immune" reactions following insertion of potent vaccine. Reactions have been observed to range from a simple papule to one in which the papule is replaced by vesiculation and pustulation, surrounded by a zone of erythema. An immediate reaction to smallpox vaccination indicates previous contact with the virus and probably residual immunity adequate for the usual exposures of American living.

However, in the face of exposure to virulent variola strains the immediate reaction can be accepted as indicating immunity only if the vaccine used is known to be of high potency and has been applied by the proper vaccinating technique.

HYGIENE.

Preventive Aspects of Occupational Dermatoses.

C. G. LANE AND B. C. GREY (*Archives of Industrial Hygiene and Occupational Medicine*, September, 1950) consider that the prevention of occupational dermatoses involves a comprehensive coordinated plan of action commencing with a survey of the incidence and type of dermatoses occurring in the particular factory or industry. This should be followed by a survey of the processes and materials used in the manufacture of the products of the factory or industry. When these surveys are completed it should be possible to determine what skin hazards are present. A programme of prevention can then be developed. Prevention would consist of elimination of the hazards completely, or if this was not possible, preventing the skin from coming into contact with the hazardous material by some mechanical means. Education of personnel is necessary regarding the precautions to be taken in handling skin irritants, the value of personal and factory cleanliness, and the necessity to report all cutaneous irritations as soon as they occur. Personnel who are resistant to skin irritants should be selected. All personnel returning to work after any serious cutaneous disease should be medically examined and carefully watched for a recurrence of the disease. Physical safeguards should be provided. These consist of facilities for washing with hot and cold water, the provision of detergents which will clean without harming the skin by excessive defatting, abrasive or irritant action, the provision of suitable protective clothing and respirators, and the provision of suitable "barrier" creams. The authors stress the need for strict maintenance and enforcement of the use of the safeguards provided. The disposal of the worker in whom occupational dermatitis has developed is discussed. In addition the authors consider that much can be done in the way of limiting the period of disability once an occupational disease has developed, by early detection of cutaneous disturbances, by proper therapy, by the prevention of complications due to disease or incorrect treatment, and by a follow-up of disabled personnel.

Observations on the Transmission of Salmonellosis in Man.

E. NETER (*American Journal of Public Health and The Nation's Health*, August, 1950) has made a number of investigations into the mode of transmission of the Salmonella organisms. These include the typhoid bacillus and more than 150 types of paratyphoid bacilli. He states that typhoid fever usually originates from man only. Active immunization is effective and "Chloromycetin" is of distinct value in the treatment of typhoid fever. Paratyphoid fever, however, may originate from animals as well as man. Immunization is less certain and "Chloromycetin" less effective in paratyphoid fever. The author has found that the placenta is an effective barrier to the transmission of Salmonella from the mother's blood to the fœtus. Salmonellosis may be transmitted during delivery from a mother suffering from diarrhœal disease, or, as in a case presented by the author, from a mother who had become a convalescent carrier. The admission into a nursery of an infant thus exposed may result in cross-infection of exposed individuals. This sequence of events may be prevented, if the admission is deferred of infants born to mothers who present evidence or give a history of recent diarrhœal disease. Salmonellæ may be present in the naso-pharynx and throat of children suffering from salmonellosis. It is possible that in these instances the disease may be spread like an air-borne infection. Consideration should be given to the prevention of dissemination of Salmonellæ by this route. A series of 43 children suffering from salmonellosis were studied to determine the frequency of the convalescent carrier state. Of these patients, 26 still excreted the paratyphoid bacillus in the fæces after clinical recovery, as shown by positive results from culture before the patients' discharge from hospital. The public health significance of this observation is obvious. Attempts to eliminate Salmonellæ from two convalescent carriers by means of the administration of large doses of both aureomycin and "Chloromycetin" for a period of seven days failed in both instances.

Disinfection of Air in Schools by Ultra-Violet Light.

F. GILCREAS AND H. ROBERTS (*American Journal of Public Health and The Nation's Health*, July, 1950) have carried out bacteriological studies on the effect of ultra-violet irradiation of the air in schools. Methods used in the bacteriological examination of air have been developed and are presented. With these methods, a median reduction of 42% was found in total bacteria per cubic foot, of 43% in bacteria settling per square foot per minute, and of 31% in streptococci in irradiated classrooms of the kindergarten, third and fifth grades. The authors state that considerable information has been acquired over a period of four years concerning the air in school rooms. Much of this information is difficult to evaluate because of the lack of similar studies available for comparison. It was found, however, that the number of bacteria-bearing particles was generally in direct relation to the amount of activity in the room; thus, single determinations showed tremendous variation within a general trend of decreasing counts from the kindergarten to the upper grades. The data compiled by comparing irradiated and unirradiated rooms within the same school were remarkably similar in a school completely equipped with ultra-violet lights and in one that had none. The epidemiological investigation carried on in the schools at the same time as the bacterial examination of the air has been limited to a study of the incidence of measles, mumps and chickenpox. Since these are all virus diseases, no correlation can be made between the epidemiological findings and the bacterial studies. Data concerning the relationship of the reduction in bacterial content in the irradiated rooms to the incidence of non-specific respiratory illness have not yet been analysed.

Immunization of Young Children.

L. W. SAUER AND W. H. TUCKER (*American Journal of Public Health and The Nation's Health*, June, 1950) report their experiences in the early immunization of infants against pertussis, diphtheria and tetanus. They state that one-half of the deaths due to pertussis occur before the seventh month, so that immunization against pertussis before the sixth month is desirable. A résumé of the results of attempts by other workers to immunize young children is given. This is followed by results obtained by the authors. They state that from the evidence presented it appears that alternate lateral gluteal areas are the most favourable sites for the intramuscular administration of alum-precipitated multiple antigen preparations. Three-monthly doses of an alum-precipitated mixture of diphtheria toxoid and pertussis vaccine administered at the ages of four, five and six months conferred adequate protection against diphtheria in 97% of cases, but in only 65% against pertussis. An alum-precipitated mixture of diphtheria and tetanus toxoids with pertussis vaccine administered to infants in three-monthly doses after the age of six months conferred immunity against diphtheria in 100% of cases, against tetanus in 96%, and against pertussis in 83%. An alum-precipitated mixture of diphtheria and tetanus toxoids with pertussis vaccine administered to infants in four-monthly doses at the age of three, four, five and six months conferred protection against diphtheria in 86% of cases, against tetanus in 100%, and against pertussis in 98%.

"Q" Fever in a Wool and Hair Processing Plant.

M. SIGEL, T. SCOTT, W. HENLE AND O. JANTON (*American Journal of Public Health and The Nation's Health*, May, 1950) describe an outbreak of "Q" fever among workers in a wool processing plant in Philadelphia. The outbreak was recognized through the routine testing of serum specimens from one patient, who had an upper respiratory infection, with several viral and rickettsial antigens, including the "Q" fever antigen. The serological and epidemiological features of the outbreak are discussed. This outbreak was caused by *Coxiella burneti* inhaled by workers handling raw wool and goat hair. The dust produced when these were handled presumably contained portions of dried ticks or tick fæces infected with *Coxiella burneti*. No known cases occurred among contacts or families of the workers. The authors suggest that outbreaks of "Q" fever in this industry could be prevented by vaccination, by the installation of an exhaust system to prevent the formation of dust in the atmosphere, or by the use of wool and hair which had been previously scoured. They also recommend that "Q" fever antigen be used with other available antigens of pneumotropic viruses in testing the serum in all cases of atypical pneumonia and undifferentiated infections of the upper part of the respiratory tract.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held at Broughton Hall Psychiatric Clinic, Leichhardt, New South Wales, on December 7, 1950. The meeting took the form of a series of clinical demonstrations by the medical superintendent, Dr. Guy Lawrance, and members of the staff of the clinic.

Hypoglycæmic Shock Treatment in Schizophrenia.

A demonstration was given of the use of hypoglycæmic shock therapy with insulin, and patients were presented to illustrate the use of this type of therapy in schizophrenia.

It was explained that the treatment aimed at the induction of full coma in the patient by the use of insulin injected intramuscularly. No food was given after 9 p.m. on the previous evening, and at 7 a.m. on the first day of treatment 15 units of ordinary insulin were given; that dose was increased by 20 or so units daily until a state of coma was induced. When that occurred a suitable average dose was arrived at for each patient by trial and error working from the lesser to the required dosage. Often patients became sensitized to the large doses of insulin, and then the dose was lowered by 20 or 30 units or more next day lest a very severe coma indeed be produced. In thirty to forty-five minutes the coma was interrupted by use of the stomach tube and administration of 16 ounces of 33% glucose in orange juice. If the state of coma did not lift or lighten appreciably in fifteen to twenty minutes, then 10 millilitres of 50% glucose solution were given intravenously. If that failed to rouse the patient the stomach tube was again used to give 16 ounces of 33% glucose solution, and the intravenous therapy was tried once more. An amount of up to 1000 millilitres of glucose in saline (5%) was run in slowly intravenously. "Coramine" could be given in five millilitre doses; adrenaline was of use sometimes. In irreversible comas those treatments were given repeatedly, warmth was applied, "Carbogen" was administered, and for restless patients sedation had to be resorted to in order to check the violent movements and to prevent exhaustion. If a patient had a very deep coma one day, then he should be subjected only to light therapy the following day. The comas were of ten minutes' duration on the first occasion and were increased in time as it was found that the patient stood them well.

Treatment was given at Broughton Hall on five days a week with the rest period on Saturdays and Sundays. After an irreversible coma therapy was continued when one week had elapsed. Sometimes coma deepened very rapidly and urgent aid had to be given at once; the doctor must not leave the insulin clinic once the injections had begun to take effect and he must be present until the last patient was fully conscious. After the treatment patients had sweet coffee and sandwiches to ease the great hunger, and ordinary dinner followed at the normal hour. The patients of the clinic were kept together at exercise and recreation after that, and they were in the care of the same attendants and nurses as were on duty during the treatment periods. A feeling of confidence and security was thus given, and sequelæ such as after-shock were more safely combated.

A brief summary was given of the various stages leading to a coma, with other important and practical details of the treatment.

It was pointed out that in very early cases about 40% of good remissions could be expected; in cases established for a year 20% of patients were assisted; in late cases 10% or fewer had a good remission of symptoms. A course of treatment should consist of about 40 comas. There was no standard number, however, and treatment was stopped when no reasonable further gain was recorded in mental status. The statement of Sakel was quoted that insulin was more like an instrument than a medicine, and as in surgery, so in high insulin dosage therapy, the result of treatment depended more on the skill of the operator than on the instrument.

The first patient present, who had had insulin coma treatment, was a married woman, aged twenty-three years, who had been admitted to the clinic in June, 1950. Her early life had been spent in Katherine and she had always been shy and retiring; she rarely ever spoke to her school mates. After the bombing of Darwin, in which the family was involved, she came to Sydney and worked in her father's shop. At the age of sixteen years she met her future husband and kept company for seven years until she married him. Two years before being admitted to the clinic she had changed her religion to become a Roman Catholic; she wanted to be a nun and indulged in long periods of fasting, in which her health suffered. A week after marriage she renounced all coitus, because of her religious feelings, and returned to her mother. A little later she became violent, assaulted her sister and smashed a mirror. She had auditory hallucinations; voices said terrible things to her, derided God and had told her that earth and heaven were the same. While she was suffering from the hallucinations, her brother decided to replace the husband; he crept into her bed, but she managed to push him out. She had ideas of reference and feelings of outside influences acting on her mind. Her actions became slow, deliberate and uncertain, with a tendency to aggression at times and her conversation was often irrelevant. She declared that she preferred girls' company to that of boys, and she could not say why she had married; she was greatly mother-fixated and exhibited an unresolved Electra complex with indications of repressed homosexuality. She had had a course of electroconvulsive therapy before coming to the clinic, but was no better for it. She had 34 full coma insulin treatments, the largest dose being 210 units. She made a good social recovery and had shown good remission of symptoms.

The next patient, a single woman, aged thirty-one years, had gone to a dentist two years before her admission to the clinic and general extraction of her teeth had begun. She was upset by the extraction and began to take "turns" in her bedroom, in which she would vomit. She then expressed a delusion that she was married to a Mr. P. and that they had a house in the bush. After a time of this bliss Mr. P. left and and she cried for months. She had auditory hallucinations and heard the man calling to her. She was dull and retarded, her memory was at fault and she had ideas of reference. She was lacking in interest and almost apathetic, and she could not fend for herself. Her condition was a dull hebephrenic type of schizophrenia precipitated by an unsuccessful love affair. She showed the cardinal features of the disease in wrongful affect, incorrect thinking, strange behaviour and an increasing desire for solitude. She had had a course of electroconvulsive therapy (17 shocks), but that did not benefit her very much because when the treatment stopped all her symptoms returned. She had had a full course of 40 full insulin comas with some benefit. The maximum dose of insulin was 140 units. The comment was made that the girl's illness was based on an actual love affair with a man, who repeatedly requested her to marry him, but she put him off so often that he married another woman rather suddenly.

The third patient was a single woman, aged nineteen years, a bank clerk, who had been admitted to the clinic on June 29, 1950, because she had been behaving strangely and had expressed death wishes. The onset had really begun about three years before, but it was at Christmas, 1949, that she began to show fatigue after some strenuous dieting, and her condition verged on *anorexia nervosa*; then she overate and took no exercise at all and became weighty. On December 31 she went for a swim and walked 12 miles to indicate her annoyance when a train did not come on time. That night she smashed the dishes in a refrigerator and broke up a table. After that she did a round of many doctors and tried many medicines, of which she would take only one or two doses and then throw them out. In February she was stood down from work because of absenteeism and inefficiency. She felt that people stared at her and expressed the delusion that her body swelled strangely, causing people to look at her in a strange and insulting manner. She neglected her appearance, did her hair untidily and dressed strangely. She became dull and apathetic and very slow in all her actions, lost her interests and could give no proper account of herself. She became lacking in insight into her illness and said that she had come to the clinic to have some pimples treated. Her condition was one of schizophrenia, katatonic in type. Examination of her background showed that her parents were very well endowed intellectually, but the father was nervy and domineering, while the mother was over-protective to her. She had had a happy childhood in a home free from want, and at school she was rather forward. She was spoilt by her mother and her two siblings. At the age of fifteen years she became gross and developed many pimples, which caused her to feel inferior; she wanted to avoid company and tried to train her hair over the pimples on the forehead. She had been rather a wilful child. The comment was made that she had an inadequate integration of her personality with mother-fixation and signs of repressed homosexuality. She had always been dependent and rather ineffectual. She was nine stone in weight on admission to the clinic and heavy for her height of five feet. Her blood pressure was slightly

raised. She had a course of deep coma insulin; 40 comas were induced, the maximum dose of insulin being 175 units. She had a good remission and was usefully employed as a waitress in the staff messroom.

The last patient in the group, a single woman, aged nineteen years, had been admitted to the clinic on June 30, 1950. She was the eldest of three children and had been a healthy child and a medium scholar at school, reaching second year at the age of fifteen years, when she left to enter a business college. She had been a typist until recently. It was stated that she had always been a shy, retiring girl, and at school thought the girls did not like her; she sat alone during the lunch hour. She used to exhibit tantrums as a child, and was very overbearing towards her two younger siblings. In the office where she worked she said that she was given too much to do, and she developed feelings of inadequacy as she found the work increasingly hard for her to do. She felt inferior because of her irregular teeth, and claimed that she was not attractive to boys; but she wanted to marry and have children. She had been most particular about her appearance and loved dancing, but had no boy friend with whom she could go out. She refused to go to church because she could not sit still for long enough. Five weeks before admission to the clinic she had to be taken home from work because she was shouting out that God had killed her and that she was going to be buried; she also heard His voice declaring that fact. At home she demanded that neighbours should come in and watch her die. She was taken to the mountains for a holiday, but was unable to mix with people. She would not talk to the other people in the house, and refused to enter the dining room. She said that she was too weak to stand up, and claimed to have a strange head. She wanted to die by suicide. At the time of the meeting she still had ideas of reference, but the hallucinations had gone. She had an impairment of memory for recent events, was idle and could not concentrate. She was foolish and labile in affect, and giggled inanely. On her admission to the clinic she had shown the schizophrenia characteristic of ambivalence of thought. On the day on which the overt conduct became too poor, she had said that all the office staff stared at her in a very sad and curious way, and she heard them say to each other "she must be dying"; then she knew that she was dead. The comment was made that the picture was one of a typical outburst of hebephrenia in a girl who had always been poorly integrated in her mental outlook. Intense inferiority, based most probably on the sense of physical inferiority set up by her consciousness of the faulty and overcrowded arrangement of her front teeth, had forced her to retreat; she did not appear to overcompensate in any way, but she sought solitude and avoided the boys whom she claimed avoided her. She sought escape in the death idea. The prognosis did not appear to be very good, and it was likely that only a remission of symptoms was to be looked for. As she was a problem child, who showed tantrums and jealousy, the chances of permanent and favourable integration of her mentality were more unlikely than in a case in which the early life showed a stronger personality. Electroconvulsive therapy had given only superficial relief. She had since had deep coma insulin therapy, 40 comas were induced, the largest dose of insulin being 260 units.

(To be continued.)

VICTORIAN BRANCH NEWS.

AT a special meeting of the Council of the Victorian Branch of the British Medical Association on December 6, 1950, the following office-bearers were elected for the ensuing year: *President*, Dr. Roy F. Watson; *Immediate Past President*, Dr. Robert Southby; *Vice-Presidents*, Dr. Charles Byrne and Dr. Leonard H. Ball; *Chairman of Council*, Dr. H. C. Colville; *Honorary Treasurer*, Dr. Douglas Thomas; *Honorary Librarian*, Dr. H. G. Furnell; *Honorary Secretary*, Dr. H. Hiller.

Correspondence.

ERYTHROBLASTOSIS FŒTALIS.

SIR: Dr. J. M. O'Connor's letter (December 2, 1950) on erythroblastosis was most interesting. He and his readers may like to know that in "What's New?" (Abbott), October, 1949, is a reference to some work by Bettina Carter on an ether extract of Rh-positive blood cells which is said to be most useful.

There are several references to the literature, including: Carter, *American Journal of Clinical Pathology*, August, 1947, and Loughrey and Carter, *American Journal of Obstetrics and Gynecology*, June, 1948. I have not seen either of these articles.

Yours, etc.,

268 Latrobe Terrace,
Geelong,
Victoria.
December 4, 1950.

MARY C. DE GARIS.

AN APPEAL FOR THE AUSTRALIAN RED CROSS SOCIETY.

THE following letter from the Australian Red Cross Society is published at the request of the General Secretary of the Federal Council of the British Medical Association in Australia.

[COPY.]

AUSTRALIAN RED CROSS SOCIETY.
Founded 1914—Incorporated by Royal Charter, 1941.

NATIONAL HEADQUARTERS.
National Headquarters Building,
122-128 Flinders Street,
Melbourne, Australia.

8th December, 1950.

Dr. J. G. Hunter,
General Secretary,
Federal Council of the British Medical Association in Australia,
135 Macquarie Street,
Sydney, N.S.W.

Dear Dr. Hunter,

In the present operations by the United Nations in Korea the result on the Korean civilian population has been disastrous in that they have lost their homes and all their possessions.

The United Nations have arranged for World Red Cross to supply eight relief teams to conduct a campaign of relief and rehabilitation to these war sufferers. The Australian Red Cross has agreed to provide one of the teams, which consists of a medical officer, an engineer and a welfare officer.

We wondered if you could arrange some publicity as to these needs by the Society. The qualifications outlined by the United Nations are:

Medical Officer Preventive Medicine.

Plans, initiates and supervises control measures against preventable diseases and injuries. Determines incidence of infectious disease in adjacent civilian communities; investigates all unusual prevalence of disease and carries out special epidemiological studies; surveys adequacy of sanitation with special reference to water and waste disposal systems, insect and rodent control, and other conditions affecting health; submits recommendations regarding the prevention and control of diseases and for the correction of sanitary defects and other conditions adversely affecting health; exercises technical supervision over the training of all personnel in personal hygiene, sanitation and other measures for the prevention of diseases; supervises and co-ordinates in major commands activities of specialists in various branches of preventive medicine such as epidemiology, venereal disease control, malaria control, nutrition, industrial hygiene, sanitary engineering and entomology; maintains liaison with appropriate civil agencies. May serve as medical inspector.

When serving as Venereal Disease Control Officer, initiates and directs a comprehensive and unified programme aimed at reducing the non-effectiveness resulting from venereal disease; assures effective operation of all measures directed towards the control of venereal diseases, including education, prophylaxis, and case finding; assures effective implementation of policies regarding diagnosis, treatment and disposition of patients with venereal diseases in co-ordination with the medical consultant or senior internist; recommends to higher authorities such administrative measures as may seem desirable.

When serving as civil affairs health officer organizes and directs the civil public health programme for area subject to military control; co-ordinates military and civilian programmes of preventive medicine and public health; advises military government officials on public health matters.

The terms of employment are as follows:

Assignment is for one year.

The salary is £1450 *plus* the provision by military control of quarters, rations, transport and other facilities necessary for the team to operate. In addition the society will provide £70, which is estimated as sufficient for the purchase from army stores on arrival in Tokyo of uniforms, suitable winter clothing *et cetera*.

Passage to and from the site of operations is provided.

(Unified Command, Tokyo, state that during the present phase of military operations in Korea, no women will be accepted.)

We are very anxious to secure the services of a member of the medical profession at the earliest possible moment for this tour of duty and will appreciate any assistance you can give us.

Yours faithfully,

(Signed) ALFRED G. BROWN,
General Secretary.

Obituary.

PAUL GREIG DANE.

WE are indebted to Dr. R. C. Winn for the following appreciation of the late Dr. Paul Greig Dane.

Paul Dane's epitaph is in the memories of his friends and of thousands who served during two wars, in the first of which he was attached to the Sixth Field Ambulance on Gallipoli. Not only did he freely give his time and himself to aid those who went to war, but he did the same for the less fortunate among civilians.

Paul Dane was one of the first in Australia to use hypnosis, and probably the first to employ abreaction. Also, realizing its capacity to aid greater numbers than other forms of psychotherapy, he was the first to introduce group therapy for ex-soldiers and civilians. Paul Dane, too, was one of the first in Australia to become interested in Freud's work, and was the most active founder of the Melbourne Institute for Psycho-Analysis, of which he was chairman for many years: at the recently held tenth anniversary conference of the Institute his memory was honoured in a valedictory address by Dr. Albert Phillips.

Paul Dane twice visited England in furtherance of professional knowledge; and he visited the United States of America in 1948, when he was made a corresponding member of the American Psychiatric Association. Though he gained his doctorate of medicine at the University of Melbourne in 1909, he is said to have taken the diploma of psychological medicine at the age of sixty-three years; his was an ever-inquiring mind.

Paul Dane was for several years President of the Royal Zoological Society of Victoria, and while in London he twice showed a film of the lyre bird at the Royal Zoological Society there. He loved animals of all kinds, but was particularly fond of horse-riding and the turf, as befits a descendant of an earlier Paul Dane who settled in Ireland and was honoured by William the Fourth. He himself came to Australia on the *Carthage*, which is reputed to be the first steamship to arrive here. His cultural interests included literature and music; his main hobby was gardening. He is survived by his wife, son and three daughters.

This short summary of his life cannot do justice to Paul Dane's rich personality; one needed to know him to appreciate his deep friendliness, and his readiness to champion everything which he felt to be of value in human affairs.

The following tribute is part of an address by Dr. Albert Phillips delivered at the tenth anniversary meeting of the Melbourne Institute for Psycho-Analysis.

But for his having been taken from amongst us recently by death, Dr. Paul Dane, who will always be remembered by us as the founding father of this Institute, would have been here by the chairman's side. I should like to say something about this man and the impact made by his personality on those of us who came under his influence. Today I visited Mrs. Dane, and there working away in the garden of her home was an old Digger of the first World War, a patient who declared that he would have killed himself long ago but for Dr. Dane. During his illness he had been working in his garden out of love and gratitude, and now, having been persuaded to give up the tablets, was still there, feeling safer in the shadow of the *mana* of the doctor even though he himself had departed. Another former patient and friend told me of his first encounter with Dane when he was suffering from an extremely severe neurotic illness. This was many years ago, and a number of psychiatrists had been unable to help him, when the late Dr. Clarence Godfrey, himself one of Melbourne's earliest psychotherapists and a pioneer here in the use of hypnosis, said to him: "Why not go along to the Repatriation Department; down there there's an irritable Irishman named Dane who seems to have a flair for this sort of thing!" This man went to Dane, recovered completely under his treatment and became his friend for life.

Dane was in fact "an irritable Irishman" and a very lovable one. He was born in Belfast of an old family, whose Viking ancestry is indicated in the family name. He was brought to Australia as a child and educated at Caulfield Grammar School and the University of Melbourne, from which he graduated in 1905 and took his M.D. degree in 1909. He was assistant medical officer of health for the City of Melbourne for two years, and it was greatly regretted when he resigned to take up private practice in Ballarat, where he remained for five years, laying the foundation of his great knowledge of medicine and of men and women. While at Ballarat he became an officer in the Sixth Field Ambulance, a mounted unit—Dane was a lover of horses and horsemanship to the end of his days—and it is characteristic of the man that on the outbreak of the first World War he volunteered on the day war was declared. He served on Gallipoli as major and was promoted lieutenant-colonel, but was invalided and later served in the First Australian General Hospital in Egypt. Subsequently he was invalided home. He also volunteered for service in the second World War, but was not accepted. His professional services were extensively used, however, and he was in great demand for his recruiting speeches.

When Dane returned to Melbourne from the first World War, he was asked to give the lectures in histology in the Medical School at the University of Melbourne, and continued to give these lectures for some time during the war years. He was interested in neurology and explored the possibility of treatment of so-called "shell-shocked" soldiers by electrical stimulation. He soon recognized the futility of these methods, and coming under the influence of such pioneers as John William Springthorpe and Clarence Godfrey turned to psychotherapy, with remarkable—and often dramatic—results. He became the first completely wholehearted and consistent exponent of Freud's theories in this State, using the earlier technique of abreaction or catharsis, of which he was a master. He was never a conventional man and was not afraid to be heterodox.

Besides his work with soldiers Dane built up a large consultant practice in psychiatry and went on with his psycho-analytical studies. In 1928 he left for a prolonged visit to Europe and was able to commence an analysis with Joan Riviere. During this year abroad he was able to spend some time in France with his friend Sir Colin MacKenzie looking for traces of primitive human types. But a doctor with a wife and four children cannot stay away from his practice indefinitely and Dane had to curtail his analytical studies and return to Melbourne, where he took up again his private practice, his work with ex-soldiers, and his work at the Alfred Hospital, where he was associated with the psychiatric clinic for sixteen years. A lone exponent of psycho-analysis for many years, Dane was always willing to instruct and to develop the interest of others in the work. When Miss Lorna Traill generously made a gift of £1500 for the furthering of psychotherapeutic work in Melbourne, he and a small group of psychiatrists interested in psycho-analysis were able to form the Melbourne Institute for Psycho-Analysis, of which he became the first chairman. When it was formed he gave up his consulting rooms and moved into the Institute's rooms, where besides carrying on his private practice he gave a great deal of time to the patients of the Institute in an honorary capacity and guided it through the difficulties of its formative years. He started our small but growing library with generous gifts from his own collection, and you will be glad to know that his name will be commemorated in the library, which is known as the Paul Dane Library.

In his early years his generous heart and profound sense of justice attracted him to socialism, but in 1910, as a

result of hearing a lecture on Henry George, he became a convinced exponent of the doctrine of the single tax and played a leading part in the Henry George Society for many years. He often said that his whole life was dominated by the teaching of two great men—Freud and George. As for socialism, he became one of its most redoubtable opponents in this city.

He also belonged to the Rating Reform League, was President of the Victorian Zoological Society and Chairman of the Board of Zoological Gardens, and was honoured by being made a Corresponding Member of the Royal Zoological Society. His love of animals took the most practical forms. Besides attending to animals in the zoo, he was a member of the Animal Welfare League and would set off into the country after disasters to the fauna, such as bushfires, to render first aid to the animals, perform surgical operations and fit prostheses such as rubber hooves. His love of horses was expressed not only in the care of his own hacks, but in his interest in racing and his membership of the Victorian Racing Club. But he was interested in all Nature and was a student of flowers and trees, and a gardener, particularly at his holiday home in the Dandenongs.

With all these interests Dane found time a few years ago, at an age when many men have retired, to undertake a hard course of study and acquire the diploma of psychological medicine amongst the first group to sit for this qualification in Melbourne. A few years later, after recovering from a serious illness, he travelled to England and America in search of further experience and worked for a while in American psychiatric hospitals and clinics. He was signalled out for special honour by the President of the American Psychiatric Association at the annual meeting, and on his return to Australia was notified that he had been made an honorary member—an honour only once before conferred on an Australian psychiatrist.

We all rejoiced at his recovery from a serious illness five years ago and hoped that he would be our leader and adviser for many years to come, but that was not to be. He endured his final painful illness with his characteristic courage, and I know that you will be with me in expressing deep sympathy for his wife and family.

DOUGLAS LEWIS BARLOW.

WE regret to announce the death of Dr. Douglas Lewis Barlow, which occurred on December 4, 1950, at Adelaide.

Medical Societies.

MELBOURNE INSTITUTE FOR PSYCHO-ANALYSIS.

THE tenth anniversary of the Melbourne Institute for Psycho-Analysis was celebrated on October 31, 1950, at the Union Building, University of Melbourne, under the chairmanship of Mr. Justice Foster, who was the chairman at the foundation of the Institute in 1940.

The recent death of Dr. Paul Dane, who was its most active founder and many times its chairman, was marked by a valedictory address by Dr. Albert Phillips.

Dr. Frank Graham then briefly reviewed the activities of the Institute. He mentioned Miss Lorna Traill's original donation of £1500, and the names of the founders, Dr. P. Dane, Dr. R. S. Ellery, Dr. P. G. Reynolds, Dr. N. A. Albiston and Dr. A. R. Phillips; he added that the President of the International Psycho-Analytical Association, Dr. Ernest Jones, who was then also President of the British Psycho-Analytical Society, became a member of the Board *in absentia*, as did Dr. Roy Winn, of Sydney. He said that the training analyst whose arrival in Australia eleven years ago made the foundation of the Institute possible was Clara Geroe, and that she was still in that capacity. He went on to say that the Institute provided treatment for patients unable to afford private fees, a child guidance clinic, seminars for students, and lectures for the public on psycho-analysis, but that the Institute's most important function was the training of candidates in psycho-analysis, of whom there were six psychiatrists and three educationists. He then welcomed Andrew Peto as another training analyst

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED DECEMBER 2, 1950.[1]

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.[2]	Australian Capital Territory.	Australia.[3]
Ankylostomiasis	•	..	..	..	..	..	..	..	..
Anthrax	•	..	..	..	..	..	..	..	..
Beriberi	•	•	•	•	•	•	..	•	..
Bilharziasis	•	..	..	..	..	..	..	..	..
Cerebro-spinal Meningitis	3(2)	..	..	..	..	..	..	..	3
Cholera	..	..	..	..	..	..	..	..	..
Coastal Fever(*a*)	•	•	..	•	•	•	•	•	..
Dengue	•	•	•	•	•	•	..	•	..
Diarrhœa (Infantile)	..	..	2(2)	..	..	..	..	..	2
Diphtheria	10(6)	3(2)	5(2)	1(1)	6(6)	..	..	..	25
Dysentery (Amœbic)	•	1	..	..	1	..	..	..	2
Dysentery (Bacillary)	•	..	3(3)	..	..	..	•	1	4
Encephalitis Lethargica	..	..	..	..	..	..	..	..	..
Erysipelas	•	•	•	..	•	•	..	..	..
Filariasis	•	..	..	..	..	..	..	..	..
Helminthiasis	•	2(2)	•	•	•	•	•	•	2
Hydatid	•	..	•	•	..	•	•	..	..
Influenza	•	•	•	..	•	•	..	•	..
Lead Poisoning	•	•	..	..	•	•	•	•	..
Leprosy	..	..	..	..	13	..	..	..	13
Malaria(*b*)	•	..	1(1)	..	..	..	..	..	1
Measles	•	..	•	249(95)	..	•	..	..	249
Plague	..	..	..	..	..	..	..	..	..
Poliomyelitis	41(14)	5(2)	17	12(9)	1	5	..	..	81
Psittacosis	•	•	•	..	•	•	•	•	..
Puerperal Fever	1	..	..	..	..	..	..	..	1
Rubella(*c*)	•	•	..	•	3(3)	•	..	..	3
Scarlet Fever	34(13)	17(8)	25(19)	10(9)	7(5)	1	..	..	94
Smallpox	..	..	..	..	..	..	..	..	..
Tetanus	•	..	..	•	•	•	•	•	..
Trachoma	•	..	•	•	•	•	•	•	..
Tuberculosis(*d*)	37(28)	28(22)	4	2(2)	6(2)	16	..	..	93
Typhoid Fever(*e*)	1	1	1	..	..	..	..	..	3
Typhus (Endemic)(*f*)	..	..	1	..	1(1)	..	..	..	2
Undulant Fever	..	..	..	..	..	..	..	..	..
Weil's Disease(*g*)	•	•	..	•	•	•	•	•	..
Whooping Cough	•	•	•	1	•	•	..	..	1
Yellow Fever	..	..	..	..	..	..	..	..	..

[1] The form of this table is taken from the *Official Year Book of the Commonwealth of Australia*, Number 37, 1946–1947. Figures in parentheses are those for the metropolitan area.
[2] Figures not available.
[3] Figures incomplete owing to absence of returns from the Northern Territory.
• Not notifiable.
(*a*) Includes Mossman and Sarina fevers. (*b*) Mainly relapses among servicemen infected overseas. (*c*) Notifiable disease in Queensland in females aged over fourteen years. (*d*) Includes all forms. (*e*) Includes enteric fever, paratyphoid fevers and other Salmonella infections. (*f*) Includes scrub, murine and tick typhus. (*g*) Includes leptospiroses, Weil's and para-Weil's disease.

organizing a companion psycho-analytical institute in Sydney, who, like the Melbourne training analyst, Clara Lazar Geroe, was a member of the British Psycho-Analytical Society. Finally, Dr. Graham mentioned that an Australian Branch of the British Psycho-Analytical Society, which would include trained members of the Melbourne and Sydney Institutes, was in course of formation.

Dr. Harry Southwood, of Adelaide, then read a paper entitled "The Psycho-Analyst and His Public Relations", the discussion of which was led by Dr. H. F. Maudsley. Professor O. A. Oeser, of the psychological department of the University of Melbourne, proposed a vote of thanks to Dr. Southwood, and Dr. Roy Winn to Mr. Justice Foster.

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Numbers 68 and 70, of November 16 and 23, 1950.

PERMANENT NAVAL FORCES OF THE COMMONWEALTH (SEA-GOING FORCES).

Appointment.—Acting Interim Surgeon Commander Robert Enwraight Lauder is appointed on loan from the Royal Navy, with seniority in rank of 1st October, 1949, dated 16th October, 1950.

Termination of Appointment.—The appointment of the following officer is terminated on reversion to the Royal Navy: Surgeon Commander Thomas Frank Miles, dated 29th October, 1950.

ROYAL AUSTRALIAN AIR FORCE.

Citizen Air Force: Medical Branch.

Norman Murchison Kater, M.C. (267549), is reappointed to a commission with the temporary rank of Squadron Leader, 5th April, 1950.

The appointment of Temporary Squadron Leader R. W. Foley (251898) is terminated, 18th September, 1950.

Medical Appointments.

The undermentioned have been appointed public vaccinators in the State of Victoria: Dr. S. H. Allen (City of St. Kilda), Dr. R. M. Cameron (Shire of Bulla), Dr. H. A. Retallick (Shire of Gordon), Dr. L. A. Fitzpatrick (Shire of Ballan), Dr. S. H. Phillips (Shire of Healesville), Dr. D. I. Fitzpatrick (Town of Sale and the East Riding of the Shire of Rosedale), Dr. J. Jona (City of Hawthorn), Dr. J. McPherson (City of Sandringham), Dr. M. H. Box (City of Footscray), Dr. H. Grover (City of Port Melbourne).

Dr. K. J. Meagher has been appointed medical officer of the Brisbane Mental Hospital, Goodna, Queensland.

Dr. Raymond Tennyson Allan has been appointed a member of the Indeterminate Sentences Board of Victoria.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Weintraub, Saul, registered in accordance with the provisions of Section 17 (1) (c) of the *Medical Practitioners Act*, 1938-1945, 234 New South Head Road, Double Bay.

Mollenhauer, Paul Louis, registered in accordance with the provisions of Section 17 (2) of the *Medical Practitioners Act*, 1938-1945, 149 Castlereagh Street, Sydney.

The undermentioned have been elected as members of the New South Wales Branch of the British Medical Association:

Angel, Henry Reece Tennant, M.B., B.S., 1950 (Univ. Sydney), Royal North Shore Hospital of Sydney, St. Leonards.

Cohn, Siegfried, registered in accordance with the provisions of Section 17B of the *Medical Practitioners Act*, 1938-1945, 17 Keating Street, Maroubra.

Lines, Verlie, M.B., B.S., 1950 (Univ. Sydney), Balmain and District Hospital, Balmain.

Magill, David Aubrey, M.B., B.S., 1948 (Univ. Sydney), Prince Henry Hospital, Little Bay.

Palmer, George, M.B., B.S., 1948 (Univ. Sydney), Australian Military Mission, Migration Branch, B.A.O.R. 19, Cologne, Germany.

Mathieson, John Milton, M.B., B.S., 1948 (Univ. Sydney), Prince Henry Hospital, Little Bay.

Diary for the Month.

JAN. 3.—Western Australian Branch, B.M.A.: Council Meeting.
JAN. 9.—New South Wales Branch, B.M.A.: Council Quarterly.
JAN. 11.—South Australian Branch, B.M.A.: Council Meeting.
JAN. 12.—Queensland Branch, B.M.A.: Council Meeting.
JAN. 16.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
JAN. 18.—Victorian Branch, B.M.A.: Executive Meeting.
JAN. 23.—New South Wales Branch, B.M.A.: Medical Politics Committee.
JAN. 24.—Victorian Branch, B.M.A.: Council Meeting.
JAN. 26.—Queensland Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney)—All contract practice appointments in New South Wales.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federal Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178 North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205 Saint George's Terrace, Perth): Norseman Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

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Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

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